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ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)	N84-10001 - N84-12026
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IAA (A-10000 Series)	A84-10001 - A84-12788
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AERONAUTICAL ENGINEERING

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 171)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in January 1984 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



Scientific and Technical Information Branch

1984

National Aeronautics and Space Administration

Washington, DC

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INTRODUCTION

Under the terms of an interagency agreement with the Federal Aviation Administration this publication has been prepared by the National Aeronautics and Space Administration for the joint use of both agencies and the scientific and technical community concerned with the field of aeronautical engineering. The first issue of this bibliography was published in September 1970 and the first supplement in January 1971.

This supplement to *Aeronautical Engineering -- A Continuing Bibliography* (NASA SP-7037) lists 567 reports, journal articles, and other documents originally announced in January 1984 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*.

The coverage includes documents on the engineering and theoretical aspects of design, construction, evaluation, testing, operation, and performance of aircraft (including aircraft engines) and associated components, equipment, and systems. It also includes research and development in aerodynamics, aeronautics, and ground support equipment for aeronautical vehicles.

Each entry in the bibliography consists of a standard bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by the first nine *STAR* specific categories and the remaining *STAR* major categories. This arrangement offers the user the most advantageous breakdown for individual objectives. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* and *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Six indexes -- subject, personal author, corporate source, contract number, report number, and accession number -- are included.

An annual cumulative index will be published.

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All publications abstracted in this bibliography are available to the public through the sources as indicated in the category sections It is suggested that the bibliography user contact his own library or other local libraries prior to ordering any publication inasmuch as many of the documents have been widely distributed by the issuing agencies, especially NASA A listing of public collections of NASA documents is included on the inside back cover

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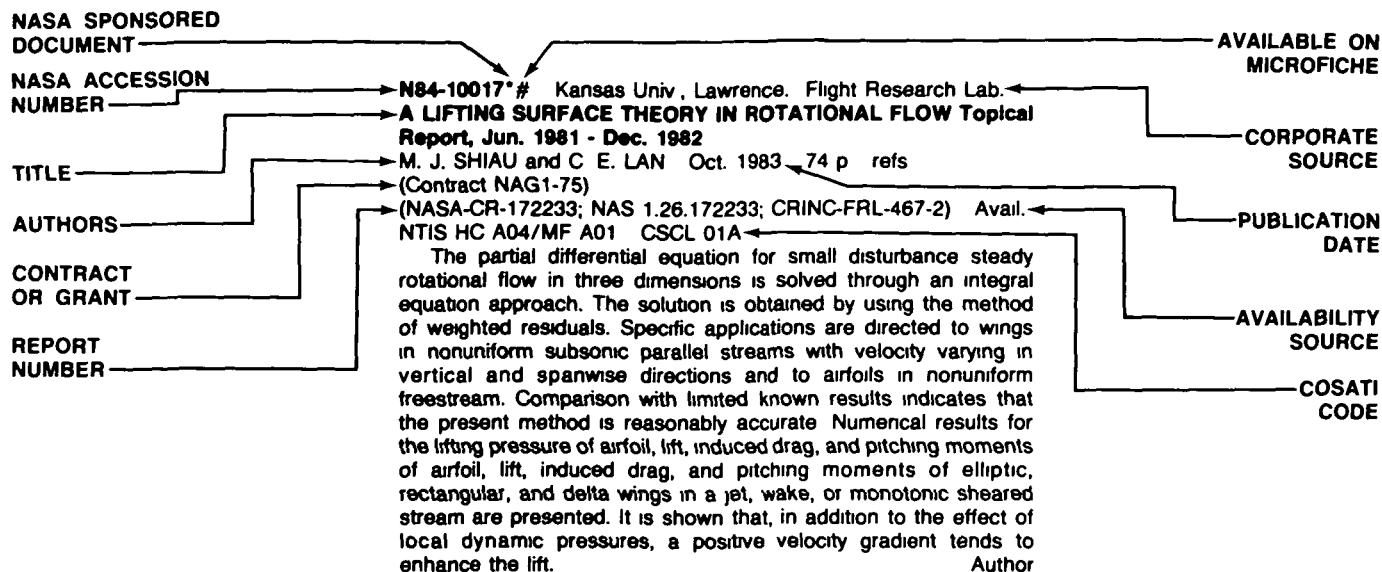
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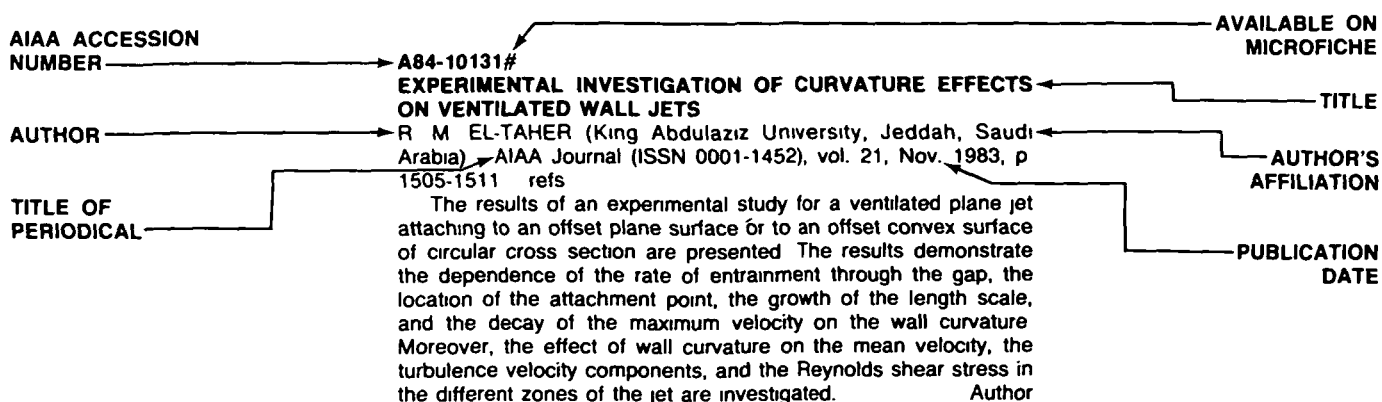
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AERONAUTICAL ENGINEERING

A Continuing Bibliography (Suppl. 171)

FEBRUARY 1984

01

AERONAUTICS (GENERAL)

A84-10621 STRATOSPHERIC HOT-AIR BALLOON COMPLETES REVOLUTION AROUND THE GLOBE

O. TALAGRAND (CNRS, Laboratoire de Meteorologie Dynamique, Paris, France) American Meteorological Society, Bulletin (ISSN 0003-0007), vol. 64, Sept. 1983, p. 1058, 1059.

The physical and operational characteristics of the MIR (montgolfiere IR) hot-air balloon launched from South Africa in December 1982, which completed on revolution around the earth in 53 days are described. The upper half of the balloon is covered with an aluminum film for absorption of the upward telluric IR flux, thus producing a greenhouse effect by superheating the inside air. The balloon volume is 36,000 cu m and can carry 200 kg while weighing 135 kg itself. The balloon carried a pressure sensor, temperature sensor, a vertical sonic anemometer, a horizontal sonic anemometer, and two horizontal magnetometers, with data transmitted on the ARGOS system and relayed through the Tiros-N and NOAA-6 spacecraft. The balloon drift was westward with the summer stratospheric winds and remained between 10-25 deg S latitude at an average 25 m/sec. The flight level varied between 15 mb at day and 45 mb at night. M.S.K.

A84-10706 SAFE ASSOCIATION, ANNUAL SYMPOSIUM, 20TH, LAS VEGAS, NV, DECEMBER 6-10, 1982, PROCEEDINGS Van Nuys, CA, SAFE Association, 1983, 336 p.

Military and civilian aircraft and facility survival and safety systems advances are explored, with an emphasis on ejection systems and subsystems. Attention is given to the components and performances of the ACES II, the SAAB JA-37 Viggen, and Ranger ejection systems. New oxygen supply systems in high performance military aircraft such as the F-16 are examined, as are the crashworthiness of helmets, computer analysis of helmet designs, and improved lap belt and restraint systems designs. The development of actively cooled aircrew flight suits is traced, as are escape techniques for crew and passengers in helicopters that are downed over the ocean. The benefits of using advanced materials to replace high-maintenance components in critical aircraft systems are discussed, and canopy fragilization, arctic survival, post-ejection injury prevention, and parachute design and evaluation are explored. D.H.K.

A84-10718 LESSONS LEARNED DURING INVESTIGATION OF T-38 ACCIDENTS

C. C. THOMPSON (USAF, San Antonio Air Logistics Center, Kelly AFB, TX) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 78-82.

Examples of catastrophic equipment failure are cited to demonstrate the need to eliminate all components that require periodic maintenance in critical areas. Two crashes of T-38 trainers

due to flap mechanism failure are explored, stressing that the mechanism represented the state of the art when built, a time when hydrogen embrittlement was unknown. Aging aircraft such as the B-52, KC-135, and F-4 are approaching or exceeding their design lifetimes, thus requiring growing maintenance attention. Incorporating advanced materials (composites) into the T-38 and other aircraft replacement parts has reduced the required maintenance and extended the lifetimes. Chemically etched or electroplated components with a cadmium coating have been identified as subject to nascent hydrogen embrittlement, and a program is described for eliminating these parts from aircraft control and life preserving equipment. D.H.K.

A84-10885 TWENTY-FIVE YEARS OF NASA AERONAUTICAL RESEARCH - REFLECTIONS AND PROJECTIONS

R. L. BISPLINGHNOFF (Tyco Laboratories, Exeter, NH) IN: Space applications at the crossroads; Proceedings of the Twenty-first Goddard Memorial Symposium, Greenbelt, MD, March 24, 25, 1983. San Diego, CA, Univelt, Inc., 1983, p. 29-40. (AAS PAPER 83-152)

NASA succeeded NACA as the prime aeronautical research and development agency of the U.S., and NACA personnel and facilities formed the core from which NASA grew. Aeronautical research was displaced for the first few years of the space program, but has expanded in funding and scope ever since, although manpower is no longer increasing. Aeronautics initiatives in the past two decades have included noise and pollution reduction, air traffic congestion relief, helicopter V/STOL research, and expansion of the technology base for current front-line military aircraft. The supercritical wing provides a greater range for commercial aircraft. Tilt-rotor technology is being explored, as are composite materials for aircraft, winglets, advanced engines, and active electronic controls. D.H.K.

A84-11051 INTERNATIONAL HELICOPTER FORUM, 14TH, BUECKEBURG AND HANOVER, WEST GERMANY, MAY 20, 21, 1982, PROCEEDINGS. PART 1 - MILITARY PART. PART 2 - CIVIL PART [INTERNATIONALES HUBSCHRAUBERFORUM, 14TH, BUECKEBURG AND HANOVER, WEST GERMANY, MAY 20, 21, 1982, VORTRAEGE. PART 1 MILITAERISCHER TEIL. PART 2 - ZIVILER TEIL.]

Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, p. Pt. 1, 299 p.; pt. 2, 356 p. In German and English.

The subjects discussed are related to the employment of armed helicopters in East and West, the demands of the West German air force with respect to the helicopters of the 1990s, West German military demands concerning helicopters for the navy of the 1990s, demand and concepts for satisfying this demand in the case of transport helicopters for the 1990s, shaft propulsion systems for helicopters of the next generation, and fiber composite structures for military helicopters. The extension of the capability of army aircraft personnel for conducting night operations by means of a utilization of image-intensifying eyeglasses is considered along with an analysis and outlook concerning an employment of night vision devices for the conduction of a military mission under conditions of darkness, and the display-oriented cockpit for low-level night flight. Attention is also given to presimulation part-task training, and mission-specific effects on helicopter flight mechanics. G.R.

01 AERONAUTICS (GENERAL)

A84-11052#

THE DEMANDS OF THE AIR FORCE WITH RESPECT TO THE HELICOPTERS OF THE 1990S [FORDERUNGEN DER LUFTWAFFE AN HUBSCHRAUBER DER 90ER JAHRE]

A. SCHLIEPER (Bundesministerium der Verteidigung, Bonn, West Germany) IN: International Helicopter Forum, 14th, Bueckeberg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 1. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 7 p. In German.

Questions regarding the employment of the helicopter UH-1D by the Air Force of West Germany are discussed. This helicopter has been used by the West German Air Force since the end of the 1960s. Requirements which are to be satisfied by the helicopter are partly related to tactical missions involving the transport of personnel and material, tactical mission support for units equipped with antiaircraft missiles, the supply of Air Force units at remote locations, and the transportation of the sick and wounded. The requirements have to be satisfied at any time of the day or at night, even under conditions of bad weather. There are, however, limitations regarding the capability of the helicopter for satisfying the various requirements. Specifications which will make an improved satisfaction of the considered requirements possible have been listed in connection with demands for a light transport and SAR helicopter that is to be employed in the 1990s G.R.

A84-11053#

MILITARY DEMANDS CONCERNING HELICOPTERS FOR THE NAVY OF THE 1990S [MILITAERISCHE FORDERUNGEN AN HUBSCHRAUBER FUER DIE MARINE DER 90ER JAHRE]

H.-P. WEYHER (Bundesministerium der Verteidigung, Bonn, West Germany) IN: International Helicopter Forum, 14th, Bueckeberg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 1. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 7 p. In German.

The military requirements which the helicopters for the West German Navy of the 1990s will have to satisfy are determined by the objectives of the Navy in case of a military conflict, and, in addition, by the particular function which the helicopter has to perform in such a case, taking into account also the characteristics of the given theater of operations. The strategic and tactical objectives for the navies of the NATO countries in the case of an armed conflict are considered, giving particular attention to the situation in the Baltic Sea and the North Sea, and the role of the helicopter. This role and the climatic conditions in the considered area determine the characteristics of helicopter design and equipment. G.R.

A84-11054#

DEMAND AND CONCEPTS FOR SATISFYING THIS DEMAND IN THE CASE OF TRANSPORT HELICOPTERS FOR THE 1990S [BEDARF UND KONZEPTE ZUR BEDARFSDECKUNG BEI TRANSPORT-HUBSCHRAUBER FUER DIE 90ER JAHRE]

G. NIEHUES (Bundesministerium der Verteidigung, Bonn, West Germany) IN: International Helicopter Forum, 14th, Bueckeberg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 1. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 17 p. In German. Sponsorship: Bundesministerium der Verteidigung. (Contract BMVG-RUEIV-4)

The evolution of the helicopter is briefly reviewed and the helicopter's current state of development is evaluated. It is found that the modern helicopter has reached a high level of technological maturity. There are currently no indications for any revolutionary changes with respect to the present basic helicopter design, taking into account the near future, including the 1990s. However, it appears that improvements concerning individual components are feasible on the basis of technological advances and design modifications. The military demand regarding a transport helicopter for the West German air force and navy can be satisfied by one helicopter model. There exist technological arguments for the development of a new helicopter for the 1990s. The costs of such a development are too high if only the German demand is

taken into account. It is, therefore, proposed to consider such a development project on a European basis. G.R.

A84-11071#

A HIGH PERFORMANCE AEROSCOPT TARGET ACQUISITION AND DESIGNATION SYSTEM

T. FOKINE (SAAB-Scania AB, Jonkoping, Sweden) IN: International Helicopter Forum, 14th, Bueckeberg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 29 p.

A target acquisition and designation system for military scout helicopters is characterized, taking the kinds of weapon systems which the helicopter will carry or support, as well as those which will threaten it, into account. The system is based on the Helios modular sighting system, which comprises a roof-mounted direct-view periscope with 12x magnification and 4.6-deg field of view, high-precision servo electronics, a hand controller, a control and display panel, and a pilot-line-of-sight indicator. This sight is fully compatible, via an LS-100 laser target marker/rangefinder, with US and NATO standard laser weapons, and is shown to provide better performance than video systems. The role of the system-equipped helicopter in various combat scenarios is discussed, and extensive tables of system parameters, ground-based weapon capabilities, and predicted helicopter performance are included. T.K.

A84-11072#

EUROPEAN IDEAS ON SCOUT HELICOPTER

J. C. PARMENTIER (Societe de Fabrication d'Instruments de Mesure, Massy, Essonne, France) IN: International Helicopter Forum, 14th, Bueckeberg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 7 p.

European development programs for improved day and night sighting systems for military helicopters are reviewed. The concept of the scout helicopter is defined, the first-generation devices of the 1960's are described, and the problems inherent in sight design are discussed. Emphasis is placed on the different optical and stabilization requirements of FLIR sensors for night observations. Some current sighting systems are illustrated in photographs. T.K.

A84-11969

THE NEW SWEDISH JAS FIGHTER PROGRAMME - AND ITS INDUSTRIAL BACKGROUND

T. R. GULLSTRAND (Saab-Scania AB, Linkoping, Sweden) Aerospace (UK) (ISSN 0305-0831), vol. 10, Oct. 1983, p. 14-20.

Steps taken at Saab-Scania to ensure the continuity of the Swedish aerospace industry are outlined, together with design features of a new fighter program. The onset of decreasing allocations to the air defense sector led to a decision to enter the commercial aircraft business with a state-of-the-art, computer avionics and composite skin computer aircraft. Another program was simultaneously initiated to develop a STOL fighter aircraft for Swedish conditions, i.e., take-off and landing from roads in remote locations. The resulting proposal, the Gripen, is intended for operation at a density of one per square mile, serving air-to-ground missions with stand-off missiles, air-to-air for stand-off attack, and frontal arc attack roles. An aircraft weighing less than 8 tons with a thrust/weight ratio of about one was selected, together with the F404 engine, canards, leading-edge flaps for aeroelastic tailoring, fly-by-wire controls, and triple redundancy in the electronics. It is noted that the development go-ahead is coming to a parliamentary vote, with a proposal partially based on 20 cost projections. M.S.K.

A84-12316#

FLIGHT TEST AIRSPACE - A VITAL PART OF THE PLAN

K. J. HOLT (McDonnell Aircraft Co., St. Louis, MO) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 6 p.
(AIAA PAPER 83-2711)

The organization, control, and use patterns of the national airspace are discussed. Air traffic consists of airlines, business aircraft, light aircraft, and military aircraft, as well as the aerospace contractor. A National Airspace Review study commissioned by the FAA examined the structure and efficiency of the airspace guidelines, the conflicts between the FAR and FAA handbooks, and evaluated ATC practices. The study led to recommendations to review military use of national airspace annually, to formally study the see-and-avoid concept at all altitudes and airspeeds, and to hasten reporting of new VFR training routes. Priority for restricted airspace is to be given to using agencies, including use of the airspace for nonhazardous activities. Restrictions are to be defined for recurring routes used by civil aircraft at speeds below 250 km and altitudes below 10,000 ft. Finally, the procedures for obtaining airspace for flight tests of new aircraft configurations are explored. M.S.K.

N84-10001# Joint Publications Research Service, Arlington, Va.
USSR REPORT: TRANSPORTATION, NO. 126

3 Oct 1983 89 p Transl. into ENGLISH from various Russian articles

(JPRS-84457) Avail: NTIS HC A05

Transportation in the U.S.S.R. is discussed. Recent developments on air, rail, and marine transportation are outlined. Airports, air transport services, cargo shipments, railcar design, container ships, and ports are among the topics discussed.

R.J.F

N84-10009 National Aeronautic Association, Washington, D. C.
WORLD AND UNITED STATES AVIATION AND SPACE RECORDS, AS OF JUNE 1, 1983

M. M. BROWN, ed. and D. BERLINER, ed. 1983 358 p
Avail: National Aeronautic Association, 821 15th Street, N.W., Washington, D.C. 20005; HC \$9.95 plus \$2.00 postage and handling

Ballooning, airship, landplane, seaplane, amphibian, rotorplane, glider and motorglider records are provided. Air cushion vehicles, speed over a recognized course, speed on a commercial air route, feminine records, U.S. national records, parachuting, model airplanes, hang gliders, man powered aircraft, and air racing are also discussed. N.W.

N84-10010# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

AGARD BULLETIN, TECHNICAL PROGRAMME, 1984

Aug. 1983 35 p

(AGARD-BUL-83/2) Avail: NTIS HC A03/MF A01

A chronological listing of the meetings tentatively scheduled to take place during 1984 and a detailed description of the individual Panel Programs, the Consultant and Exchange Program, and the Military Committee Studies Program are included. The total budget required to support the proposed 1984 AGARD Technical Programme is presented. The Publication Summary identifies by activity the AGARD publications scheduled for publication in 1984. S.L.

N84-10011*# National Aeronautics and Space Administration, Washington, D. C.

AERONAUTICS RESEARCH AND TECHNOLOGY PROGRAM AND SPECIFIC OBJECTIVES, FISCAL YEAR 1982

W. B. OLSTAD 17 Jun. 1981 269 p

(NASA-TM-85474; NAS 1.15:85474) Avail: NTIS HC A12/MF A01 CSCL 01B

The Aeronautics Research and Technology program is broken down into two program areas (research and technology base, and systems technology programs) which are further broken down into succeeding more detailed activities to form a work breakdown

structure for the aeronautics program: program area, program/discipline objective, specific objective, and research and technology objective and plan (RTOP). A detailed view of this work breakdown structure down to the specific objective level is provided, and goals or objectives at each of these levels are set forth. What is to be accomplished and why are addressed, but not how. The letter falls within the domain of the RTOP. Author

N84-10012# General Accounting Office, Washington, D. C.
Mission Analysis and Systems and Acquisition Div.

AIR FORCE AND NAVY TRAINER AIRCRAFT ACQUISITION PROGRAMS

5 Jul. 1983 37 p refs

(PB83-231076; GAO/MASAD-83-22; B-209123) Avail: NTIS HC A03/MF A01 CSCL 15E

The status of one Navy and two Air Force Programs to acquire 1,184 trainer aircraft is examined. Plans to acquire T-45 aircraft for training pilots need to be firmed up. GRA

N84-11095# Joint Publications Research Service, Arlington, Va.
POOR QUALITY AIRCRAFT EXTERIOR SURFACES CAUSE GREATER FUEL EXPENDITURES

V. SERGEYEV In its USSR Rept.: Transportation, No 129 (JPRS-84573) p 13-16 20 Oct. 1983 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 18 Jun 1983 p 3
Avail: NTIS HC A05

Economizing on fuel and energy resources has become a special problem in recent years. As was emphasized at the June Plenum of the CPSU Central Committee, salient characteristics of modern economic thinking are a truly business like nature, and a thrifty attitude toward public wealth and toward the utilization of material, labor and financial resources. A persistent struggle is now being waged for each kilogram of fuel. But still there is an entire area of work where not everything is being done yet to economize not only on kilograms, but on tens and hundreds of thousands of tons of fuel and lubricants each year. We are speaking about work directed toward improving the quality of the external surface of aircraft. Author

N84-11096# Joint Publications Research Service, Arlington, Va.
POLYURETHANE AIRCRAFT COATINGS FOR FUEL SAVINGS

A. OVSYANNIKOV and G. SELYUKOVA In its USSR Rept.: Transportation, No. 129 (JPRS-84573) p 17-19 20 Oct. 1983 Transl. into ENGLISH from Vozdushnyy Transport (Moscow), 5 Jul. 1983 p 2

Avail: NTIS HC A05

One of the ways of reducing the aerodynamic resistance of the aircraft is to improve the paint coating. An entire complex of requirements are placed on paint and varnish materials that are used to protect aviation equipment. The paints should provide reliable protection of the aircraft and elements of its structure from corrosion, they should be resistant to changes in temperatures and abrasive wear and tear, minimum attraction of dirt, and a good appearance. The materials that are used at the present time for painting aircraft that are based on acrylic, epoxy and chlorovinyl copolymers do not meet requirements fully enough, which fairly frequently leads to an essential increase in the roughness and a deterioration of the aerodynamic characteristics. The nature of these materials is such that it is impossible to give them better characteristics. There is only one solution--to change over to polyurethane paint and varnish materials. Author

N84-11098*# Operations Research, Inc., Silver Spring, Md.
AERONAUTICS SYSTEMS TECHNOLOGY STUDIES Final Report

J. S. BAUCHSPIES Oct. 1983 33 p

(Contract NASW-3554)

(NASA-CR-174572; NAS 1.26:174572) Avail: NTIS HC A03/MF A01 CSCL 01B

Data collection and analysis in the areas of air transportation, aircraft manufacturing and sales, airline operations, market projections, internal trade, and energy consumption; legislation and

01 AERONAUTICS (GENERAL)

regulations, technology needs; surveys; decision-making; cost analyses; and technology transfer are discussed. N.W.

N84-11099*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
JOINT UNIVERSITY PROGRAM FOR AIR TRANSPORTATION RESEARCH, 1982
Washington Oct. 1983 147 p refs Conf. held in Hampton, Va., 10 Dec 1982
(NASA-CP-2285; L-15688; NAS 1.55:2285) Avail: NTIS HC A07/MF A01 CSCL 01B

A summary of the research on air transportation is addressed including navigation; guidance, control and display concepts; and hardware, with special emphasis on applications to general aviation aircraft. Completed works and status reports are presented also included are annotated bibliographies of all published research sponsored on these grants since 1972.

N84-11112# Committee on Science and Technology (U. S. House).

AIRCRAFT MAINTENANCE AND FIRE

Washington GPO 1983 226 p refs Hearing before the Subcomm. on Transportation, Aviation and Materials of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no 15, 27 Jun. 1983

(GPO-24-247) Avail: Subcommittee on Transportation, Aviation and Materials

The setting of cabin fire safety standards by the FAA and the need for improving service difficulty reporting system are discussed as well as NASA's efforts in developing fire-blocked seats and fireworthy cabin materials, windows, and fuels Cooperation with the aircraft industry is examined including annual feedback on airworthiness. A.R.H.

N84-11113# Naval Fleet Materiel Support Office, Mechanicsburg, Pa. Operations Analysis Div.

RIM-AIR (REPAIRABLE INTEGRATED MODEL FOR AVIATION) STUDY

F. C. STRAUCH and J. W. GARDNER 30 Jun. 1983 107 p
(AD-A131141; REPT-155) Avail: NTIS HC A06/MF A01 CSCL 12A

Naval Supply Systems Command proposed the Repairable Integrated Model for Aviation (RIM-AIR) model to compute Aviation Consolidated Allowance List (AVCAL) requirements during the provisioning the AVCAL development processes at Navy Aviation Supply Office (ASO). The AVCAL is a consolidated listing of the range and depth of aeronautical materiel required by ships, Marine Air Groups, and Naval Air Stations to support aircraft operations. RIM-AIR was designed to eliminate the dichotomy between the materiel availability goals and stockage criteria promulgated in OPNAVINST 4441.12A while complying with the policy established by DODIS 4140.45, 4140.46, and 4140.47. This report analyzes alternative range and safety level criteria for RIM-AIR, recommends specific alternatives and discusses issues relevant to the implementation of these recommendations. Author (GRA)

N84-11114# Air Force Logistics Command, Wright-Patterson AFB, Ohio.

THE EFFECT OF AIRCRAFT AGE AND FLYING HOURS ON MAINTENANCE COSTS Final Technical Report

N. W. FOSTER and H. D. HUNSAKER Jun. 1983 43 p refs
(AD-A131534; AFLC-TR-82-099) Avail: NTIS HC A03/MF A01

This study was accomplished to investigate the effect of age and flying hours on costs to maintain an aircraft. Available literature was searched on the subject. Depot maintenance cost data for eight years were utilized to compare the costs of different models of four basic aircraft. The different models compared reflect different aircraft age and number of flying hours with similar missions. Author (GRA)

N84-11115# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany).

AEROSPACE RESEARCH ACTIVITIES IN WEST GERMANY Annual Report, 1981/82

Apr. 1983 127 p

Avail: NTIS HC A07/MF A01

Transport and communications systems; aircraft and spacecraft technology; remote sensing; and energetics and propulsion research is summarized. Flight mechanics; fluid mechanics; materials and structures; wind tunnel investigations; and human factors engineering activities are described. Author (ESA)

N84-11116# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

AEROELASTIC CONSIDERATIONS IN THE PRELIMINARY DESIGN OF AIRCRAFT

Loughton, England Sep. 1983 322 p refs In ENGLISH and FRENCH Conf. held in London, 11-12 Apr. 1983

(AGARD-CP-354; ISBN-92-835-0338-4) Avail: NTIS HC A14/MF A01

The latest trends in aeroelastic analysis, aeroelastic tailoring, structural optimization and flutter optimization are reviewed. The application of these techniques to aircraft design is discussed

02

AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

A84-10076*

SYMPOSIUM ON NUMERICAL AND PHYSICAL ASPECTS OF AERODYNAMIC FLOWS, 2ND, CALIFORNIA STATE UNIVERSITY, LONG BEACH, CA, JANUARY 17-20, 1983, PROCEEDINGS

Symposium supported by NSF, U.S. Navy, U.S. Army, and NASA. Long Beach, CA, California State University, 1983, 454 p.

The present conference covers topics concerning the measurement and calculation of interactive flows, together with problems posed by subsonic and transonic wings, missiles, and ships. Discussions are presented on the time-dependent finite difference simulation of unsteady interactive flows, Navier-Stokes equation methods, numerical solutions for spatially periodic boundary layers, the application of unsteady laminar triple deck theory to viscous-inviscid interaction, the coupling of boundary layer and Euler equation solutions, and viscous-inviscid flow interactions. Also discussed are leading and trailing edge flows, three-dimensional wing flows, small disturbance calculations including entropy corrections, an inviscid computational method for tactical missiles, and boundary layer and flow separation characteristics of bodies of revolution at incidence. O.C.

A84-10077*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TIME-DEPENDENT FINITE-DIFFERENCE SIMULATION OF UNSTEADY INTERACTIVE FLOWS

G. S. DEIWERT and H. E. BAILEY (NASA, Ames Research Center, Moffett Field, CA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 13 p. refs

The solution of the time-dependent, Reynolds-averaged, Navier-Stokes equations for unsteady, interacting flows by finite-difference algorithms is discussed. Specific examples include (1) unsteady transonic flow over a thick biconvex airfoil, (2) determination of buffet boundaries for a transonic lifting airfoil, (3) the simulation of aileron buzz and (4) dynamic stall. Algorithms considered include explicit methods, mixed (or hybrid) methods, and fully implicit methods. Consideration of time scales for

computational stability, computational accuracy, and physical accuracy and the use of time-dependent adaptive meshing to realize computational efficiency are also discussed Author

A84-10078* Cincinnati Univ., Ohio.

A DIRECT METHOD FOR THE SOLUTION OF UNSTEADY TWO-DIMENSIONAL INCOMPRESSIBLE NAVIER-STOKES EQUATIONS

K. N. GHIA, G. A. OSSWALD, and U. GHIA (Cincinnati, University, Cincinnati, OH) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 16 p. refs

(Contract AF-AFOSR-80-0160, NSG-3267)

The unsteady incompressible Navier-Stokes equations are formulated in terms of vorticity and stream function in generalized curvilinear orthogonal coordinates to facilitate analysis of flow configurations with general geometries. The numerical method developed solves the conservative form of the transport equation using the alternating-direction implicit method, whereas the stream-function equation is solved by direct block Gaussian elimination. The method is applied to a model problem of flow over a back-step in a doubly infinite channel, using clustered conformal coordinates. One-dimensional stretching functions, dependent on the Reynolds number and the asymptotic behavior of the flow, are used to provide suitable grid distribution in the separation and reattachment regions, as well as in the inflow and outflow regions. The optimum grid distribution selected attempts to honor the multiple length scales of the separated-flow model problem. The asymptotic behavior of the finite-differenced transport equation near infinity is examined and the numerical method is carefully developed so as to lead to spatially second-order accurate wiggle-free solutions, i.e., with minimum dispersive error. Results have been obtained in the entire laminar range for the backstep channel and are in good agreement with the available experimental data for this flow problem. Author

A84-10079#

GLOBAL SOLUTION PROCEDURES FOR INCOMPRESSIBLE LAMINAR FLOW WITH STRONG PRESSURE INTERACTION AND SEPARATION

S. G. RUBIN and D. R. REDDY (Cincinnati, University, Cincinnati, OH) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 10 p. refs

(Contract AF-AFOSR-80-0047)

Global or relaxation formulations for the reduced form of the Navier-Stokes equations, frequently referred to as parabolized Navier-Stokes (PNS), are presented. Difference procedures and relaxation solutions for the (u,v,p) system are presented. The continuity equation is satisfied exactly at each grid point and a Poisson pressure equation is not required explicitly. The development of a second composite (U,phi,G) velocity relaxation procedure for the primitive variable equations is also discussed. For the (u,v,p) system, several model problems, e.g., finite flat plate, trough, boattail and airfoil, are considered. Strong pressure interaction is evident in each case and axial flow separation occurs for several of the problems. The questions of accuracy, stability, convergence rate, and implied difference forms of the pressure and vorticity equations are addressed. Author

A84-10080#

COMPUTATION OF FLOW PAST A HYPERSONIC CRUISER

J. S. SHANG and W. L. HANKEY (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 9 p. refs

Numerical simulations of a hypersonic cruiser were accomplished by means of the mass-averaged Navier-Stokes equations at a nominal Mach number of six and a Reynolds number of fifteen million. The computations of flow at the zero and ten

degree angles of attack were performed on a CRAY-1 computer utilizing a grid consisting of over 56,000 points. The present results adopting a branch-cut mesh system yielded superior numerical resolution over the previous solution using a wrap-around grid distribution. Numerical results are presented showing the detailed flow field structure, density and vorticity distribution, and velocity field. These results indicate that the wing-fuselage configuration investigated generates an unfavorable interference factor.

Author

A84-10082#

THE INTERACTION BETWEEN A STEADY LAMINAR BOUNDARY LAYER AND AN OSCILLATING FLAP - THE CONDENSED PROBLEM

P. W. DUCK (Manchester, Victoria University, Manchester, England) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 12 p. refs

Numerical results are presented for the viscous interaction between a flap performing small amplitude time oscillations, and an otherwise steady, laminar, boundary layer. The method used involves Fourier decomposing the solution in time, a technique which appears to have a number of advantages over more conventional time marching schemes. Author

A84-10084#

MEASUREMENTS AND CALCULATIONS OF A SEPARATING BOUNDARY-LAYER AND THE DOWNSTREAM WAKE

D. ADAIR, B. E. THOMPSON, and J. H. WHITELAW (Imperial College of Science and Technology, London, England) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 12 p. Research supported by the Ministry of Defence (Procurement Executive) and Education Department of the Northern Ireland. refs

A combination of total-head pressure, static-pressure, hot-wire and flying hot-wire probes have been used to quantify the pressure and velocity characteristics of the flow in the vicinity of a trailing flap whose angle of incidence results in boundary layer separation, a large region of recirculating flow and a curved downstream wake. A two-dimensional form of the time-averaged Navier-Stokes equations has been solved numerically with a finite difference grid obtained by a solution of Laplace equation and the results compared with the measurements. The general flow patterns are well calculated and the results are in close accord in some regions of the flow. In others, including the near-wall region and near wake, significant discrepancies exist and numerical tests suggest that these are due to numerical assumptions although the two-equation turbulence model and related wall functions are also likely to be deficient. Author

A84-10085#

(WHY?) A FINITE ELEMENT ALGORITHM FOR THE PARABOLIC NAVIER-STOKES EQUATIONS

A. J. BAKER (Tennessee, University, Knoxville, TN) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 12 p. refs

The three-dimensional Navier-Stokes equations governing steady, turbulent subsonic flows have been simplified into the 'parabolic' form using a formal order of magnitude analysis procedure. The results of this analysis confirm that the transverse momentum equations, to first order, govern appropriate pressure distributions, and that the continuity equation governs first order effects of transverse plane velocities. This paper summarizes the identification of a well-posed, initial-boundary value differential equation description, and construction and evaluation of a numerical solution algorithm for the parabolic Navier-Stokes equations in physical variables. Author

02 AERODYNAMICS

A84-10086#

WING DESIGN AND ANALYSIS - YOUR JOB

A. M. O. SMITH IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 10 p.

An historical account is given of the developing character and effectiveness of aerodynamic computational methods, with special reference to the requirements of wing design and the recent impact of computational fluid dynamics. Attention is given to the various aerodynamic performance prediction tasks that remain difficult to obtain in even an imprecise, estimational form, and speculation is undertaken concerning the computational fluid dynamics advancements, predicated on both improved digital computer performance and more powerful and efficient algorithms, which may be reasonably expected in the years ahead. O.C.

A84-10087#

NUMERICAL VISCID-INVISCID INTERACTION IN STEADY AND UNSTEADY FLOWS

J.-C. LE BALLEUR (ONERA, Chatillon-sous-Bagneux, Hauts-de-Seine, France) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 13 p. Research supported by the Societe Nationale Industrielle Aerospatiale. refs (ONERA, TP NO. 1983-8)

An assessment is undertaken of recent advancements in numerical methods, based on viscous-inviscid interaction, which are applicable to lifting flows with strong interaction phenomena and separations. The composite solutions are deduced from a defect formulation of the viscous equations, and are approximately solved with a boundary layer-like integral method coupled with an overlapping inviscid problem where boundary conditions are controlled by viscosity. Application methods are discussed for the cases of two-dimensional flow over airfoils in low speed, transonic or unsteady conditions, and for three-dimensional flows over wings. O.C.

A84-10089#

VISCOUS-INVISCID MATCHING USING HIGHER-ORDER SHEAR-LAYER EQUATIONS

P. BRADSHAW, M. J. KAVANAGH, and D. MOBBS (Imperial College of Science and Technology, London, England) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 9 p. Research supported by the Ministry of Defence (Procurement Executive). refs

A progress report is given on three related projects, in all of which elliptic equations are used to describe shear layers with significant upstream influence, such as occurs near trailing edges or rapid changes in surface curvature. The large computing times usually required for iterative elliptic solutions are avoided, or disguised, by imbedding the shear layer iteration in the iteration loop required to match any shear layer solution to a solution for the outer 'inviscid' flow. Programs for calculation of flow over single airfoils are running in incompressible and compressible flow (in the latter case with moderate shock induced separation) and extension to multi element airfoils is in hand. Author

A84-10090#

A COMPARISON BETWEEN THE PREDICTED AND EXPERIMENTAL CHARACTERISTICS OF A NACA 64(3)-418 AEROFOIL AT LOW REYNOLDS NUMBERS

P. M. RENDER and J. L. STOLLERY (Cranfield Institute of Technology, Cranfield, Beds., England) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 14 p. Research supported by the Ministry of Defence. refs

The Eppler and Sommers (1980) computer program for low speed airfoil design is presently applied to the study of the NACA

64(3)-418 airfoil profile in the 300,000-1,000,000 Reynolds number range, yielding performance predictions that are then compared with recent experimental results. Agreement has thus far been found to be poor for the lift and drag coefficients, while the predicted positions of laminar separation agree reasonably well with experiment. The predicted positions of turbulent reattachment and separation are, however, in error. Nevertheless, the program allows airfoil roughness and freestream turbulence to be taken into account. Good agreement is noted between present program results and those of Van Ingen (1970). O.C.

A84-10091#

A SURVEY OF RECENT WORK ON INTERACTED BOUNDARY LAYER THEORY FOR FLOW WITH SEPARATION

H. McDONALD and W. R. BRILEY (Scientific Research Associates, Inc., Glastonbury, CT) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 13 p. refs

It is now widely recognized that the steady boundary layer equations can be used to predict small regions of flow separations when the interaction with the outer inviscid flow is allowed for. A very close relationship between the formalism of the finite Reynolds number approach of treating the interacting boundary layer equations and the so-called triple deck approach to unravel the structure of asymptotic high Reynolds number interacting shear layers is also now widely accepted. The alternative procedure of approaching the problem numerically via the ensemble-averaged Navier-Stokes equations is possible, and the steady interacted boundary layer approach is attractive when numerical solutions of the interacted boundary layer equations are of sufficient generality and can be routinely obtained accurately and more efficiently than solutions of the Navier-Stokes equations. Thus, the numerical treatment of the interacted boundary layer approach is critical to ensure a net benefit is realized relative to the alternatives. Further, since there is now widespread agreement on the interacted boundary layer formulation, attention here is devoted to elucidating, comparing and contrasting some elements of the numerical approaches to solving the interacted system. Author

A84-10092#

AN INTERACTIVE APPROACH TO SUBSONIC FLOWS WITH SEPARATION

T. CEBECI (California State University, Long Beach, CA) and R. W. CLARK (McDonnell Douglas Aircraft Co., Long Beach, CA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 7 p. refs (Contract NSF MEA-80-18565)

A viscous-inviscid interaction procedure is presented for computing incompressible separation bubbles in two-dimensional flow over lifting airfoils. The scheme consists of an inviscid-flow method, based on the technique of conformal mapping, together with an inverse boundary-layer method which makes use of the Cebeci-Smith algebraic eddy-viscosity formulation together with the Mechul-function approach. The coupling between the viscous and the inviscid calculations is achieved through the use of a set of interaction coefficients computed using the conformal mapping method. These coefficients define the relationship between the boundary-layer thickness, represented by means of a blowing distribution on the airfoil surface, and the external inviscid velocity distribution. Results are presented for the calculation of separation bubbles occurring at the leading edge and midchord of the the NACA 663-018 airfoil at both lifting and nonlifting conditions. Author

A84-10093#

A CALCULATION METHOD OF LEADING EDGE SEPARATION BUBBLES

C. GLEYZES, J. COUSTEIX, and J. L. BONNET (ONERA, Centre d'Etudes et de Recherches de Toulouse, Toulouse, France) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 12 p. refs (ONERA, TP NO 1983-10)

This paper is devoted to a method developed for the calculation of transitional separation bubbles at the leading edge of an airfoil at incidence. This method is mainly based on: the solution in inverse mode, of global boundary layer equations; a viscous-inviscid interaction scheme, and the solution, in inverse mode too, of a local inviscid problem. The experimental study performed at the same time is also briefly reported. In particular, the detailed study of transition in a separation bubble led to the physics of the phenomenon and was at the origin of the transition criterion introduced in the boundary layer calculation. Author

A84-10094#

PREDICTION OF SUBSONIC SEPARATION BUBBLES ON AIRFOILS BY VISCOUS-INVISCID INTERACTION

O. K. KWON (General Motors Corp., Detroit Diesel Allison Div., Indianapolis, IN) and R. H. PLETCHER (Iowa State University of Science and Technology, Ames, IA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 9 p. Army-supported research. refs

An iterative viscous-inviscid interaction calculation procedure is used to predict leading edge and midchord separation bubbles on airfoils in steady subsonic flow. The procedure utilizes an inverse finite-difference boundary layer calculation scheme to predict the viscous flow and a direct Hilbert integral formulation for the inviscid flow. Three models for laminar-turbulent transition are discussed. Predictions are compared with experimental measurements for several transitional separation bubble flows at angles of attack up through 7 percent. Author

A84-10095#

UNSTEADY VISCOUS TRANSONIC FLOW COMPUTATIONS USING THE LTRAN2-NLR CODE COUPLED WITH GREEN'S LAG-ENTRAINMENT METHOD

R. HOUWINK (Nationaal Lucht- en Ruimtevaartlaboratorium, Amsterdam, Netherlands) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 8 p. Research supported by the Nederlands Instituut voor Vliegtuigontwikkeling en Ruimtevaart. refs

Results of unsteady inviscid and viscous transonic flow computations are presented and compared with experimental data for the NACA64A006 airfoil with oscillating flap, for the NACA64A010 airfoil and for a supercritical airfoil oscillating in pitch. The computations were performed using the NLR version of the NASA-Ames computer code LTRAN2, coupled with the lag-entrainment method of Green for a turbulent boundary layer. The computed effect of the boundary layer on the unsteady airloads (reduction of the magnitude and a positive phase shift) generally leads to a better agreement with experimental data. The remaining differences may be due to the low frequency small perturbation potential approximation, the weak interaction modelling and wall interference effects. For various cases considered, in comparison with the unsteady boundary layer methods developed at ONERA the steady method of Green predicts an about similar effect of the boundary layer on the unsteady airloads. Author

A84-10096#

VISCOUS/INVISCID INTERACTION ANALYSIS OF ASYMMETRIC TRAILING-EDGE FLOWS

V. N. VATSA and J. M. VERDON (United Technologies Research Center, East Hartford, CT) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 12 p. 17. (Contract N00019-81-C-0295)

Contributions are made to finite Reynolds number, viscous/inviscid interaction theory for laminar, subsonic flow past a thin-airfoil trailing edge. In particular, an analytical/computational technique is developed for predicting high Reynolds number, attached or separated, trailing-edge and near-wake flow. The analysis is based on interacting boundary-layer theory in which the outer inviscid and the inner viscous flows are solved simultaneously to determine the complete flow past the displacement body. Inviscid solutions are based on linear airfoil theory and viscous solutions are determined by a finite difference approximation to the boundary-layer equations cast in Levy-Lees variables. A semi-inverse viscous/inviscid iteration procedure is employed in which viscous and inviscid solutions are repeatedly determined until the inviscid pressure distribution at the displacement surface matches the viscous pressure distribution. This approach is assessed through comparisons with previous solutions for incompressible flow past a modified flat plate airfoil at an angle of attack. In addition, results of parametric studies are presented to illustrate the effects of angle of attack, Reynolds number, Mach number and wake curvature on trailing-edge flow behavior. Author

A84-10097#

MEASUREMENTS OF ATTACHED AND SEPARATED TURBULENT FLOWS IN THE TRAILING-EDGE REGIONS OF AIRFOILS

A. NAKAYAMA (Douglas Aircraft Co., Long Beach, CA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 12 p. refs

Measurements of incompressible turbulent flows near the trailing edge have been made in three different configurations: (1) a conventional airfoil at zero incidence with near-symmetric flow, (2) a supercritical airfoil at an angle of attack of 4 degrees with strongly asymmetric but attached flow, and (3) supercritical airfoil at a high angle of attack of 12 degrees with upper-surface boundary-layer separation. Mean flow and turbulence including three Reynolds stress components, four triple correlations and some frequency spectra were obtained using pressure and hot-wire probes as well as a laser-doppler velocimeter. Selected results are presented to show the features of viscous-inviscid interaction and characteristics of turbulence in the trailing-edge region. Author

A84-10098# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

NUMERICAL SIMULATION OF TURBULENT TRAILING EDGE FLOWS

C. C. HORSTMAN (NASA, Ames Research Center, Moffett Field, CA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 9 p. refs

Numerical simulations of the time-dependent, Reynolds-averaged, Navier-Stokes equations, employing a two-equation turbulence model, are presented and compared with measurements from a series of trailing edge experiments at transonic Mach numbers. The test flows include an asymmetric flow with no separation, an asymmetric flow with a small region of separation and a symmetric flow with a large shock-wave induced separated zone. Comparisons are made for mean surface quantities as well as for mean and fluctuating flow-field quantities. For the trailing-edge flows with little or no separation, the solutions correctly predict all the major features of the flow field. Treatment of the

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viscous-inviscid interaction was found to be important for predicting these test cases. Two-equation eddy-viscosity turbulence models were found to be adequate for these flows. However, for the shock-wave induced separation case, these turbulence models were inadequate to predict this flow field. Modifications of the turbulence model to correct these deficiencies are discussed.

Author

A84-10099#

PROBLEMS ASSOCIATED WITH THE AERODYNAMIC DESIGN OF MISSILE SHAPES

J. N. NIELSEN (Nielsen Engineering and Research, Inc., Mountain View, CA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 17 p refs

The purpose of the paper is to discuss various trends in the design of tactical missiles which influence the future directions of missile aerodynamics. Some of the subjects discussed include airframe-inlet interference, high angle of attack problems, waveriders, efficient hypersonic missiles, computational fluid dynamics applied to missile aerodynamics, aerothermal design and supersonic stores. A number of specific areas where increased emphasis is needed in missile aerodynamics are suggested.

Author

A84-10100#

THEORETICAL AND EXPERIMENTAL DYNAMIC STALL INVESTIGATIONS ON A ROTOR BLADE TIP

W. GEISLER (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne, West Germany) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 6 p. Research supported by the National Research Council. refs

Theoretical and experimental investigations have been carried out on oscillating blade tips at moderate and high steady mean incidences and oscillation amplitudes. Some selected data of these tests are compared with a previously developed prediction method based on potential theory to investigate the main effects of viscosity in different domains of dynamic stall. A simple correction procedure is described to take into account the main effects of viscosity on the unsteady airloads. To get a more detailed insight into the beginning of unsteady separation on oscillating profiles a finite-difference procedure has been developed to calculate the unsteady boundary-layer equations. This method has been applied to the oscillating flat plate problem as a first step. The application to problems of more practical interest like profiles under pitching motion is straightforward.

Author

A84-10102#

THREE-DIMENSIONAL WAKE OF A SWEEP WING

J. COUSTEIX, G. PAILHAS, and B. AUPOIX (ONERA, Centre d'Etudes et de Recherches de Toulouse, Toulouse, France) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 10 p refs (ONERA, TP NO. 1983-9)

The properties of a turbulent three-dimensional wake behind a swept wing are analyzed. The sweep angle and the incidence have been chosen to generate very dissymmetric initial conditions of the wake. One of the aims of the experiment is to study the relaxation of this initial dissymmetry. The experiment is also aimed at providing a detailed set of data for testing calculation methods and turbulence schemes. For this, detailed measurements of mean velocity profiles and of Reynolds stresses profiles have been carried out. Particular attention has been paid to Reynolds stress measurements. These have been carried out by using several types of hot-wire probes (45 deg slanting sensor probe, X-wire probe and four-wire probe) and the various results are compared. Two calculation methods have been applied. The first is an integral method and the second is a field method in which the turbulence scheme is a transport equation model.

Author

A84-10103*# George Washington Univ., Hampton, Va.

TRANSONIC SMALL DISTURBANCE CALCULATIONS INCLUDING ENTROPY CORRECTIONS

M. HAFEZ and D. LOVELL (George Washington University, Hampton, VA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 8 p. NASA-supported research refs

Murman's fully conservative mixed type finite-difference operators are first modified. A special sonic point operator with an iterative damping term is introduced which helps the convergence and does not affect the spatial conservative differences. Reliable calculations with second order supersonic schemes are obtained using two sonic operators, the regular sonic point operator followed by a first order supersonic scheme. Also, shock point operator is shown to be equivalent to fitting a locally normal shock terminating the supersonic region. The potential calculations are then modified to account for the non-isentropic jump conditions using a simple shock fitting procedure based on Prandtl relation. The entropy increase across the shock is calculated in terms of the Mach number upstream of the shock and the effect of the generated vorticity is estimated via Crocco relation. Different examples are calculated and extensions to the full potential equation are discussed.

Author

A84-10104*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

THE EFFICIENT SOLUTION OF TRANSONIC WING FLOW FIELDS

T. L. HOLST, N. R. SUBRAMANIAN (NASA, Ames Research Center, Moffett Field, CA), and S. D. THOMAS (Informatics General Corp., Palo Alto, CA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 13 p. refs

An evaluation of the transonic-wing-analysis computer code TWING is presented. TWING utilizes a fully implicit, approximate-factorization iteration scheme to solve the full-potential equation in conservative form. A numerical elliptic-solver grid-generation scheme is used to generate the required finite-difference mesh. Several wing configurations have been analyzed, and comparisons of computed results have been made with available experimental data. Results indicate that the code is robust, accurate (when significant viscous effects are not present), and efficient. TWING generally produces solutions an order of magnitude faster than other conservative, full-potential codes using successive-line overrelaxation. The present method is applicable to a wide range of isolated wing configurations, including high-aspect-ratio transport wings and low-aspect-ratio, high-sweep, fighter configurations.

Author

A84-10105#

TRANSONIC FLOWFIELD COMPUTATION USING A MODIFIED SHOCK-POINT OPERATOR

L. T. CHEN (McDonnell Douglas Research Laboratories, St. Louis, MO) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings . Long Beach, CA, California State University, 1983, 16 p. Research supported by the McDonnell Douglas Independent Research and Development Program. refs (Contract N000167-81-C-057)

The development of higher-order finite-difference schemes for application to transonic wing-body flow calculations is described. These schemes treat supersonic flows and shocks more accurately than most existing schemes. A transformed full potential equation in a general curvilinear coordinate system is derived, and higher-order operators are introduced. A new shock-point operator produces Mach number jumps at a shock that agree reasonably well with Rankine-Hugoniot values. Second- and third-order, quasi-conservative, and fully conservative schemes are thereby developed for general geometries where flow directions can be approximately aligned with coordinate lines in supersonic regions. The fully conservative schemes are developed by modifying an

existing finite-volume algorithm, while the quasi-conservative schemes are developed by solving the transformed full potential equation directly with the addition of the second- and third-order artificial viscosities at supersonic points, and the corresponding first- and second-order shock-point operators at shock points. To evaluate the proposed shock-point operators, a model problem was studied, consisting of flow through a converging-diverging planar channel, with a shock in the diverging section. Computed results are presented for an ONERA-M6 wing on a vertical wall and on a semi-infinite fuselage, and compared with corresponding experimental data. Author

A84-10106#**STORE SEPARATION AT TRANSONIC SPEEDS**

S. S. STAHARA (Nielsen Engineering and Research, Inc., Mountain View, CA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 14 p. Research supported by the Nielsen Engineering and Research, Inc. refs

A review is provided of the state of the art of methods currently employed for predicting store separation at transonic speeds. Both experimentally- and theoretically-based methods are surveyed. A discussion of the various underlying aspects of the store separation problem, in particular, those most crucial at transonic speeds is provided. Future developments required for these methods to become usable in a design mode are identified, and a possible next plateau of theoretical modeling development is suggested. Author

A84-10107#**NAVIER-STOKES COMPUTATIONAL STUDY OF THE INFLUENCE OF SHELL GEOMETRY ON THE MAGNUS EFFECT AT SUPERSONIC SPEEDS**

W. B. STUREK, D. C. MYLIN, B. GUIDOS, and C. J. NIETUBICZ (U.S. Army, Ballistics Research Laboratory, Aberdeen Proving Ground, MD) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 10 p. refs

The results of a computational study using thin layer Navier-Stokes codes to examine the effects of shell nose tip and afterbody geometry at supersonic speeds are presented. The geometries considered include sharp, hemisphere cap, flattened nose configurations, and a parametric variation of boattail shape. Th results are presented primarily as the aerodynamic coefficient versus Mach number for Mach numbers from 1.5-5. The Magnus effect is shown to be strongly influenced by nose bluntness as well as the geometry of the shell afterbody. Author

A84-10108#**DEVELOPMENT OF BOUNDARY LAYERS AND SEPARATION PATTERNS ON A BODY OF REVOLUTION AT INCIDENCE**

H. U. MEIER, H.-P. KREPLIN (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer experimentelle Stroemungsmechanik, Goettingen, West Germany), and H. VOLLMEERS (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer theoretische Stroemungsmechanik, Goettingen, West Germany) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 9 p. refs

Detailed measurements in three-dimensional boundary layers and separated flow fields, developing on a prolate spheroid, are presented. The discussion is concentrated on the possible topological structure of separation patterns resulting from laminar or turbulent boundary layer flows. A hypothesis about the transition from an unsteady two-dimensional axisymmetric flow separation into a steady three-dimensional vortex flow is established. Author

A84-10109#**CALCULATION OF BOUNDARY LAYERS AND SEPARATION ON A SPHEROID AT INCIDENCE**

V. C. PATEL and J. H. BAEK (Iowa, University, Iowa City, IA) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 13 p. Army-supported research. refs (Contract AF-AFOSR-80-0148-B)

The capabilities and limitations of first-order boundary layer theory are illustrated through consideration of three-dimensional boundary layers for the case of a 6:1 slenderness ratio spheroid, at an incidence of 10 deg, at two different Reynolds numbers. At the lower Reynolds number, the laminar boundary layer calculations are in good agreement with the data on the windward side of the body. The solutions are interpreted in light of previous proposals on the topology of three-dimensional flow separation, but are by themselves insufficient for the identification of a clear topological alternative. The calculations at the higher Reynolds number involve laminar, transitional and turbulent flow, and indicate the need for improvement of the turbulence model for better description of the transitional flow. O.C.

A84-10110#**STERN BOUNDARY-LAYER FLOW ON TWO THREE-DIMENSIONAL BODIES HAVING ELLIPTICAL TRANSVERSE CROSS-SECTIONS**

T. T. HUANG, N. C. GROVES, and G. S. BELT (David W. Taylor Naval Ship Research and Development Center, Bethesda, MD) IN: Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, Long Beach, CA, January 17-20, 1983, Proceedings. Long Beach, CA, California State University, 1983, 22 p. refs (Contract NAVY PROJECT ZR-000-01)

A comprehensive set of experimental pressure, velocity and turbulence data are presented for two simple three-dimensional models having 2:1 and 3:1 elliptical transverse cross sections. The Lighthill displacement body concept is used to predict the pressure distributions over the models. The predicted pressure distributions are in good agreement with the measured pressure distributions. Around the corner regions over the major axes of the models the three-dimensional boundary-layer equations do not predict well the measured mean velocity distributions. In these regions the boundary layers are much thicker than the cross section dimensions and differences in curvatures between the flow and body surface are very large. However, over large areas of relatively flat body surfaces, the computed and measured mean velocity distributions are in good agreement. As was found in the axisymmetric case, the measured eddy viscosity and mixing-length parameters in the stern region are much smaller than those of a thin boundary layer. Author

A84-10126#**A MULTIGRID STRONGLY IMPLICIT PROCEDURE FOR TRANSONIC POTENTIAL FLOW PROBLEMS**

N. L. SANKAR (Lockheed-Georgia Co., Marietta, GA) AIAA Journal (ISSN 0001-1452), vol 21, Nov. 1983, p. 1481, 1482. refs

Previously cited in issue 15, p. 2342, Accession no. A82-31919

A84-10128#**THE BOUNDARY LAYER ON AN AXISYMMETRIC BODY WITH AND WITHOUT SPIN**

J. T. KEGELMAN, R. C. NELSON, and T. J. MUELLER (Notre Dame University, Notre Dame, IN) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1485-1491. refs (Contract DAAG29-78-G-0102)

Previously cited in issue 20, p. 3655, Accession no. A80-45880

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A84-10129*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CONSERVATIVE FULL-POTENTIAL CALCULATIONS FOR AXISYMMETRIC, TRANSONIC FLOW

L. L. GREEN and J. C. SOUTH, JR. (NASA, Langley Research Center, Transonic Aerodynamic Div., Hampton, VA) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1492-1499. refs

Previously cited in issue 17, p. 2873, Accession no. A81-38082

A84-10130#
COMPUTATION OF THE ASYMMETRIC VORTEX PATTERN FOR BODIES OF REVOLUTION

J. E. GRAHAM and W. L. HANKEY (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1500-1504. refs

Previously cited in issue 06, p. 794, Accession no. A82-17737

A84-10131#
EXPERIMENTAL INVESTIGATION OF CURVATURE EFFECTS ON VENTILATED WALL JETS

R. M. EL-TAHER (King Abdulaziz University, Jeddah, Saudi Arabia) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1505-1511. refs

The results of an experimental study for a ventilated plane jet attaching to an offset plane surface or to an offset convex surface of circular cross section are presented. The results demonstrate the dependence of the rate of entrainment through the gap, the location of the attachment point, the growth of the length scale, and the decay of the maximum velocity on the wall curvature. Moreover, the effect of wall curvature on the mean velocity, the turbulence velocity components, and the Reynolds shear stress in the different zones of the jet are investigated. Author

A84-10133*# Purdue Univ. School of Science at Indianapolis, Ind.
APPLICATION OF A FINITE ELEMENT ALGORITHM TO THE SOLUTION OF STEADY TRANSONIC EULER EQUATIONS

H. U. AKAY and A. ECER (Purdue University, Indianapolis, IN) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1518-1524. refs

(Contract NSG-3294)

Previously cited in issue 15, p. 2344, Accession no. A82-31939

A84-10134#
NUMERICAL STUDY OF THE TURBULENT FLOW PAST AN AIRFOIL WITH TRAILING EDGE SEPARATION

C. M. RHIE (Ford Motor Co., Detroit Diesel Allison Div., Indianapolis, IN) and W. L. CHOW (Illinois, University, Urbana, IL) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1525-1532. refs

(Contract DAAG29-79-C-184)

Previously cited in issue 15, p. 2346, Accession no. A82-31958

A84-10135#
NUMERICAL SIMULATION OF FLOW AROUND A THREE-DIMENSIONAL TURRET

J. S. SHANG, W. L. HANKEY, JR. (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH), and S. C. PUROHIT AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1533-1540. refs

Previously cited in issue 15, p. 2348, Accession no. A82-31973

A84-10144#
VORTEX AND MOMENTUM THEORIES FOR HOVERING ROTORS

A. H. FLAX (Institute for Defense Analyses, Alexandria, VA) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1595, 1596. refs

A seeming paradox in the vortex theory for hovering rotors has been discussed by Miller (1982). However, this apparent

paradox can be resolved by recognizing that the assumption of cylindrical shape of vortex sheets is only valid in the ultimate wake. It is shown that vortex theory can be unambiguously applied to the hovering rotor and, for the case of an infinite number of blades, is substantially equivalent to the momentum theory of the actuator disk. However, simplified models of the vortex wake such as those discussed by Miller are useful, since they can often provide valuable insights into aspects of vortex interaction with the rotor. G.R.

A84-10146#
CORRELATION OF HYPERSONIC STAGNATION POINT HEAT TRANSFER AT LOW REYNOLDS NUMBERS

S. NOMURA (National Aerospace Laboratory, Tokyo, Japan) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1598-1600. refs

Heat transfer at the stagnation point is investigated analytically in a blunt body flying at high altitude and velocity. A correlation equation is developed to estimate the heat-transfer rate at low Reynolds numbers solely in terms of freestream conditions. Good agreement is found with other theoretical estimations and with experimental values. T.K.

A84-10147*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IMPLICIT, NONSWITCHING, VECTOR-ORIENTED ALGORITHM FOR STEADY TRANSONIC FLOW

I. LOTTATI (NASA, Ames Research Center, Moffett Field, CA) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1601-1603. refs

A rapid computation of a sequence of transonic flow solutions has to be performed in many areas of aerodynamic technology. The employment of low-cost vector array processors makes the conduction of such calculations economically feasible. However, for a full utilization of the new hardware, the developed algorithms must take advantage of the special characteristics of the vector array processor. The present investigation has the objective to develop an efficient algorithm for solving transonic flow problems governed by mixed partial differential equations on an array processor. G.R.

A84-10148*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
APPLICABILITY OF THE INDEPENDENCE PRINCIPLE TO SUBSONIC TURBULENT FLOW OVER A SWEEPED REARWARD-FACING STEP

G. V. SELBY (NASA, Langley Research Center, High-Speed Aerodynamics Div., Hampton, VA) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1603, 1604. refs

Prandtl (1946) has concluded that for yawed laminar incompressible flows the streamwise flow is independent of the spanwise flow. However, Ashkenas and Riddell (1955) have reported that for turbulent flow the 'independence principle' does not apply to yawed flat plates. On the other hand, it was also found that this principle may be applicable to many turbulent flows. As the sweep angle is increased, a sweep angle is reached which defines the interval over which the 'independence principle' is valid. The results obtained in the present investigation indicate the magnitude of the critical angle for subsonic turbulent flow over a swept rearward-facing step. G.R.

A84-10181
FLOW PAST AXISYMMETRIC BODIES WITH THREE CONSTANT-VELOCITY REGIONS [TECHENIE OKOLO OSESIMMETRICHNYKH TEL S TREMA UCHASTKAMI POSTOIANNOI SKOROSTI]

L. A. KOZHURO PMTF - Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (ISSN 0044-4626), July-Aug. 1983, p. 63-67. In Russian. refs

A class of axisymmetric bodies has been designed in such a way as to minimize the pressure gradients at the body surface for the case of incompressible nonviscous fluid flows. For such bodies, the flow velocity is constant in the front, middle, and rear parts of

the surface. With the pressure gradient at the surface being small, the maximum perturbed flow velocity is close to the minimum velocity possible for a given body length and volume. V.L.

A84-10184
EXCITATION AND GROWTH OF INSTABILITIES IN THREE-DIMENSIONAL STATIONARY BOUNDARY LAYERS [O VOZBUZHDENII I RAZVITII NEUSTOICHIVOSTEI V TREKHMERNYKH STATSIONARNYKH POGRANICHNYKH SLOIAKH]

V. N. ZHUGULEV PMTF - Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (ISSN 0044-4626), July-Aug. 1983, p. 100-110. In Russian. refs

A general method is proposed for studying the development of perturbations in three-dimensional boundary layers. Particular attention is given to the case of two-mode wave propagation, with one of the modes having the character of an instability. The mechanism of instability excitation by waves of the same frequency but of different phase velocities is investigated. The general aspects of the development of a three-dimensional wave packet are discussed. V.L.

A84-10504#
ANALYTICAL AND EXPERIMENTAL STUDY OF AXISYMMETRIC UNDEREXPANDED JETS

K. SETO (Saga University, Saga, Japan) and M. HAYASHI (Kyushu University, Fukuoka, Japan) Japan Society for Aeronautical and Space Sciences, Transactions (ISSN 0549-3811), vol 26, Aug. 1983, p. 91-102. refs

A theoretical and experimental investigation of underexpanded sonic jets through axisymmetric conical nozzles was conducted in order to determine the effect of the convergence angle on those jets in the whole range of angles which can be used for practical purposes under various nozzle exit conditions. A solution was obtained for the flowfield inside the nozzle and a new differential equation was derived which may be applied to the case of a considerably large inclination angle of the wall. Attention was given to the boundary conditions. The shapes of the sonic line and the jet boundary were obtained analytically and experimentally along with the location of the shock wave. Good agreement was found between the theoretical and experimental results. N.B.

A84-10560#
EFFECT OF INCREASED TURBULENCE ON THE FLOW AROUND A TRANSONIC PROFILE [EINFLUSS ERHOEBTER TURBULENZ AUF DIE UMSTROMUNG EINES TRANSSONISCHEN PROFILS]

A. HEDDERGOTT and E. STANEWSKY (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer experimentelle Stromungsmechanik, Goettingen, West Germany) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports. Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 16 p. In German. refs

Transonic wind tunnel investigations have been conducted on the use of a turbulence grid to heighten the degree of turbulence and thereby to increase the effective Reynolds number. The effect of the increased free flow turbulence on the boundary layer development is studied in terms of the pressure distributions on a supercritical airfoil wing profile for both free and forced transitions. C.D.

A84-10562#
TRANSONIC FLOW AROUND A PROFILE WITH HEAT INPUT VIA CONDENSATION [TRANSSONISCHE PROFILUMSTROMUNG MIT WAERMEZUFUHR DURCH KONDENSATION]

G. SCHNERR (Karlsruhe, Universitaet, Karlsruhe, West Germany) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports. Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 10 p. In German. refs

Changes in level transonic flows around a profile caused by spontaneous condensation of steam in moist air is experimentally investigated. Systematic changes in the flow field and at the profile

surface of a circular arc with a thickness parameter of ten percent are found in comparison to adiabatic flow at the same inflow Mach number under conditions of constant absolute humidity and continually increasing relative humidity in the resting state. The profile pressure resistance can either be increased or decreased as a function of the relative humidity in the resting state. C.D.

A84-10563#
CHANGE REGARDING THE CAMBER OF THE WING OF THE AIRBUS A300-600 [WOELBUNGSÄNDERUNG AM TRAGFLÜGEL DES AIRBUS A300-600]

J. MANTEL (Messerschmitt-Bölkow-Blohm GmbH, Bremen, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov. 11, 12, 1982, Paper. 13 p. In German

The Airbus A300-600, which represents an advanced variant of the A300B4, is provided with a modified A300-wing. This modification makes it possible to raise the buffet boundary, while simultaneously reducing the drag during the cruising flight. The technological basis for the wing modification was obtained in a research project concerned with an enhancement of the payload. The project was mainly concerned with the design of a chamber-increasing modification in the region of the straight trailing edge. The approach makes it possible to affect the transonic flow about the wing. It is found that the considered design objectives can be fully realized on the basis of a positive preadjustment of the landing flap tabs. G.R.

A84-10564#
AERODYNAMIC IMPROVEMENTS IN WING AND PROPELLER DESIGN AS EXEMPLIFIED BY THE DO 28 TNT [AERODYNAMISCHE VERBESSERUNG FUER TRAGFLÜGEL UND PROPELLERAUSLEGUNGEN AM BEISPIEL DER DO 28 TNT]

D. WELTE (Dornier GmbH, Friedrichshafen, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov. 11, 12, 1982, Paper. 19 p. In German. refs

A new technology wing and an improved propeller have been developed, constructed, and flight tested. Both wing and propeller are suitable for a light, two-engine transport aircraft with PTL engines in the 750 PS class. The test stand consisted of the modified fuselage and steering gear of the Do 28 TNT Sky servant. The aerodynamic and flight-mechanical aspects of the program are discussed. C.D.

A84-10571
LEADING EDGE FLAP SYSTEMS FOR SLIM WINGS: 'VORTEX FLAPS'? [VORDERKANTEN-KLAPPENSYSTEME FUER SCHLANKE FLÜGEL 'VORTEX FLAPS'?]

W. STAUDACHER (Messerschmitt-Boelkow-Blohm GmbH, Unternehmensbereich Flugzeuge, Ottobrunn, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov. 11, 12, 1982, 24 p. In German. refs (DGLR PAPER 82-103; MBB/FE 122/S/PUB/102)

The suitability of leading edge flap systems for slim wings is examined for a number of wing types, and the appropriateness of 'vortex flaps' as a solution to the problem of getting minimum induced resistance during intensive use of nonlinear supplementary drive is studied. Results are obtained for highly swept back wings including strake wings and double delta wings and for the wings of a typical fighter plane. The effect of leading edge flaps on the aircraft stability is also addressed. C.D.

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A84-10574*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

HIGH ANGLE-OF-ATTACK AERODYNAMICS OF A STRAKE-CANARD-WING V/STOL FIGHTER CONFIGURATION
D. A. DURSTON and J. A. SCHREINER (NASA, Ames Research Center, Moffett Field, CA) American Institute of Aeronautics and Astronautics, Aircraft Design, Systems and Technology Meeting, Fort Worth, TX, Oct. 17-19, 1983. 11 p. refs
(AIAA PAPER 83-2510)

High angle-of-attack aerodynamic data are analyzed for a strake-canard-wing V/STOL fighter configuration. The configuration represents a twin-engine supersonic V/STOL fighter aircraft which uses four longitudinal thrust-augmenting ejectors to provide vertical lift. The data were obtained in tests of a 9.39 percent scale model of the configuration in the NASA Ames 12-Foot Pressure Wind Tunnel, at a Mach number of 0.2. Trimmed aerodynamic characteristics, longitudinal control power, longitudinal and lateral/directional stability, and effects of alternate strake and canard configurations are analyzed. The configuration could not be trimmed (power-off) above 12 deg angle of attack because of the limited pitch control power and the high degree of longitudinal instability (28 percent) at this Mach number. Aerodynamic center location was found to be controllable by varying strake size and canard location without significantly affecting lift and drag. These configuration variations had relatively little effect on the lateral/directional stability up to 10 deg angle of attack. Author

A84-10899#

UNSTEADY PRESSURE ON A CAMBERED BLADE UNDER PERIODIC GUSTS (COMPARISON WITH THE EXPERIMENTS)

Y. MURAKAMI (Osaka University, Toyonaka, Japan), T. HIROSE (Fukui Institute of Technology, Fukui, Japan), T. ADACHI (Tsukuba, University, Sakura, Ibaraki, Japan), and M. ISHIKAWA (Mitsubishi Electric Corp., Marugame, Kagawa, Japan) JSME, Bulletin (ISSN 0021-3764), vol. 26, Aug. 1983, p. 1315-1322. refs

An experimental investigation was conducted to clarify the validity and the limitations of the analytic predictions of an unsteady pressure on a blade under periodic gusts. The unsteady pressure distributions around both cambered and symmetrical blades with angle of attack were measured. The results were compared with the theoretical ones considering the effects of angle of attack and camber. An attempt was made to predict the unsteady pressure due to an effect of blade-thickness theoretically. The theoretical predictions taking account of this effect agreed well with the experimental results. Author

A84-11042*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

INVESTIGATION OF TANGENTIAL BLOWING APPLIED TO A SUBSONIC V/STOL INLET

R. R. BURLEY and D. P. HWANG (NASA, Lewis Research Center, Aerodynamics and Engine Systems Div., Cleveland, OH) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 926-934. refs

Previously cited in issue 17, p. 2675, Accession no. A82-35195

A84-11049*# Virginia Polytechnic Inst. and State Univ., Blacksburg.

JET TRAJECTORIES AND SURFACE PRESSURES INDUCED ON A BODY OF REVOLUTION WITH VARIOUS DUAL JET CONFIGURATIONS

J. A. SCHETZ, A. K. JAKUBOWSKI (Virginia Polytechnic Institute and State University, Blacksburg, VA), and K. AOYAGI (NASA, Ames Research Center, Moffett Field, CA) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 975-982. refs
(Contract NAS2-10437)

Previously cited in issue 05, p. 579, Accession no. A83-16508

A84-11107

NUMERICAL DESIGN OF A SHOCKLESS TRANSONIC QUASI-AIRCRAFT

M. NAKAMURA (National Aerospace Laboratory, Chofu, Tokyo, Japan) Physical Society of Japan, Journal (ISSN 0031-9015), vol. 52, Aug. 1983, p. 2706-2710. refs

In order to design a shock-free aircraft in a transonic flow, a numerical simulation is carried out on a three-dimensional flow past a quasi-aircraft composed of a body, a sweepback wing and a tail unit in a physical space when the aircraft has no lift. The design condition of the shockless transonic flow is that the Mach number of the uniform flow is 0.87 and the aircraft angle of attack is zero. The method used is the extended artificial flow method for a three-dimensional potential flow and the flow model includes the effects of the wind tunnel walls. Author

A84-11174

LIFTING AEROFOIL CALCULATION USING THE BOUNDARY ELEMENT METHOD

G. F. CAREY and S. W. KIM (Texas, University, Austin, TX) International Journal for Numerical Methods in Fluids (ISSN 0271-2091), vol. 3, Sept.-Oct. 1983, p. 481-491. refs

The boundary integral formulation and boundary element method are extended to include lifting flow problems. This involves inclusion of a branch cut in the flow field and imposition of a Kutta condition to determine the circulation, Gamma. Additional boundary integral contributions arise from the cut surface. Techniques for calculating Gamma are developed, and a superposition procedure is treated which permits very efficient computation. Numerical results are presented for an NACA0012 airfoil at several angles of attack. Author

A84-11352

ISOLATION OF DISCONTINUITIES IN COMPUTATIONS OF ONE-DIMENSIONAL UNSTEADY GAS FLOWS [VYDELENIE RAZRYVOV PRI RASCHETE ODNOMERNYKH NESTATSIONARNYKH TECHENII GAZA]

O. M. BELOTSEKOVSKII, V. G. GRUDNITSKII, and V. N. RUGALIN (Moskovskii Fiziko-Tekhnicheskii Institut, Dolgoprudny, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 272, no. 1, 1983, p. 49-52. In Russian. refs

Solutions to hyperbolic equations are usually characterized by flow discontinuities, which complicates the computation process. The isolation of these discontinuities significantly reduces the number of computation nodes, thus saving computer time; it also makes it possible to obtain a more accurate representation of flow evolution. A method is proposed here which allows the isolation of both strong and derivative discontinuities. In accordance with this method, the computation region is divided by the discontinuity lines into smooth flow zones; the number and location of nodes in the smooth flow zones is determined, at each time level, by the solution character and can vary from layer to layer. The main principle governing the construction of the grid is uniform accuracy of solution representation over the entire region. V.L.

A84-11446

AN EXPERIMENTAL STUDY OF LOCAL HEAT TRANSFER IN A TURBULENT BOUNDARY LAYER AT SUPERSONIC VELOCITIES [EKSPERIMENTAL'NOE ISSLEDOVANIE MESTNOI TEPLOOTDACHI V TURBULENTNOM POGRANICHNOM SLOE PRI SVERKHZVUKOVYKH SKOROSTIAKH]

N. F. RAGULIN and I. U. G. SHVALEV (Inzhenerno-Fizicheskii Zhurnal (ISSN 0021-0285), vol. 45, Oct. 1983, p. 538-542. In Russian refs

Local heat transfer in a turbulent boundary layer was studied experimentally in a wind-tunnel over a wide range of Mach (1.8-6.2) and Reynolds (2.5×10 to the 6th - 84×10 to the 6th) numbers and temperature factors (0.28-1.37). An empirical expression has been obtained for calculating heat transfer coefficients for a turbulent boundary layer. The results are in good agreement with the available experiment data. It is noted that the Reynolds number and temperature factor range used in the present study covers all the existing wind-tunnel data. V.L.

A84-11581*# Ohio State Univ., Columbus.

ADAPTIVE GRID RELOCATION ALGORITHMS FOR TRANSONIC FULL POTENTIAL CALCULATIONS USING ONE-DIMENSIONAL OR TWO-DIMENSIONAL DIFFUSION EQUATION

S. NAKAMURA (Ohio State University, Columbus, OH) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 49-58. refs
(Contract NCA2-OR-565-101)

The effect of solution-adaptive grids using an interpolative grid relocation algorithm on two-dimensional transonic full potential flow calculations is studied with extensions to three dimensions in mind. One-dimensional or two-dimensional diffusion equation is solved to obtain the grid density control function for generating adaptive grids. The results of flow solution for NACA-0012 and Gates-Leaet airfoils show a significant improvement of accuracy in the CP distributions. However, further studies are recommended on the questions (1) what information from the initial flow solution should be passed on to the solution-adaptive grid generation scheme, and (2) how to optimize the accuracy of the solution through the use of adaptive grids. Author

A84-11582*# Stanford Univ., Calif.

A CHIMERA GRID SCHEME

J. L. STEGER (Stanford University, Stanford, CA), F. C. DOUGHERTY (NASA, Ames Research Center, Applied Computational Aerodynamics Branch, Moffett Field, CA), and J. A. BENEK (Calspan Field Services, Inc., Arnold Air Force Station, TN) IN Advances in grid generation, Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 59-69. refs

A mesh system composed of multiple overset body-conforming grids is described for adapting finite-difference procedures to complex aircraft configurations. In this so-called 'chimera mesh,' a major grid is generated about a main component of the configuration and overset minor grids are used to resolve all other features. Methods for connecting overset multiple grids and modifications of flow-simulation algorithms are discussed. Computational tests in two dimensions indicate that the use of multiple overset grids can simplify the task of grid generation without an adverse effect on flow-field algorithms and computer code complexity. Author

A84-11586#

COMPUTATION OF PROPELLER NACELLE INTERFERENCE FLOWS USING STREAMTUBE CO-ORDINATES

A. BREEZE-STRINGFELLOW (Dowty Rotol, Ltd., Gloucester, England) and O. R. BURGGRAF (Ohio State University, Columbus, OH) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 107-116. Research supported by Dowty Rotol, Ltd. refs

Mutual aerodynamic interference will occur between a nacelle and operating propeller in close proximity. The case of an axisymmetric nacelle and uniformly loaded propeller disc in inviscid and irrotational flow is considered. Computational results are desired for the pressure distribution on the nacelle, the effect of the nacelle on a slipstream shape and on the velocity profile at the propeller. The flow equations are solved by standard second order accurate finite difference equations in streamtube co-ordinates. Accuracy compatible with present panel method programs is achieved for cases of no propeller thrust. Reasonable agreement with experimental data over a range of propeller thrusts is demonstrated. Finally, consideration is given to the possible methods of improving results by relaxing some of the present computational restraints, notably to allow the introduction of slipstream swirl and variable blade loading. Author

A84-11588*# Rockwell International Science Center, Thousand Oaks, Calif.

APPLICATION OF A TWO-DIMENSIONAL GRID SOLVER FOR THREE-DIMENSIONAL PROBLEMS

V. SHANKAR, K.-Y. SZEMA (Rockwell International Science Center, Thousand Oaks, CA), and S. RUDY (Rockwell International Corp., Columbus, OH) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 123-133. refs
(Contract NAS1-15820)

A two-dimensional elliptic grid solver is presented and its application to various three-dimensional configurations, both internal and external, is demonstrated. The method uses proper forcing terms to cluster grid points near boundaries with a specified grid spacing and allows grid lines to intersect the boundaries at a specified angle. By segmenting the region, grid results are generated for sharp leading edged configurations and wing-vertical tail combinations. Author

A84-11590#

NUMERICAL SOLUTION OF THE EULER EQUATIONS ON BODY-CONFORMING CURVILINEAR GRIDS

R. K. AGARWAL and J. E. DEESE (McDonnell Douglas Research Laboratories, St. Louis, MO) IN Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 139-141. Research supported by the McDonnell Douglas Independent Research and Development Program.

In the present computation of the transonic flowfields in and around complex, two-dimensional configurations, by means of the solution of Euler equations on body-conforming curvilinear grids, a modular solution approach is adopted whereby an independently generated grid is coupled with the flow solver. Coordinate generation is based on the algebraic multisurface method of Eiseman (1979), which generates curvilinear grids with precise control for both internal and external flow configurations. Because of the grid density control available, accurate solutions for two-dimensional flowfields can be determined with a minimal number of grid points. O.C.

A84-11591*# Cincinnati Univ., Ohio.

HYBRID C-H GRIDS FOR TURBOMACHINERY CASCADES

U. GHIA, K. N. GHIA, and R. RAMAMURTI (Cincinnati University, Cincinnati, OH) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 143-149. refs
(Contract NAG3-194)

The three basic types of grids available for two-dimensional cascade configurations are examined with respect to their relative advantages and disadvantages. Subsequently, a hybrid coordinate system is proposed such that it combines the major advantages of the C-type and the H-type meshes. The development of the hybrid grid system employs the patching of appropriate regions of these two basic mesh systems such that the transformed domain has a multi-block structure. Viewing the transformed domain as a three-dimensional surface enables the coordinates to be continuous across the boundaries of the patches in a natural manner. Author

02 AERODYNAMICS

A84-11592#

MESH GENERATION FOR WING-BODY-TAIL CONFIGURATIONS

W.-H. JOU and J. E. MERCER (Flow Industries, Inc., Research and Technology Div., Kent, WA) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 167-171.

(Contract N00014-80-C-0453)

A three-dimensional computational mesh around a wing-body-tail combination is generated by using a combination of complex transformations and a series of algebraic procedures. It is topologically impossible to generate a single C-type mesh around both wing and tail. Therefore, this procedure employs two C-type meshes, one embedded in another. A C-type wing body mesh is first generated. Then a region around the tail bounded by wing-body mesh surfaces is defined. In this subregion, another C-type mesh around the tail is generated. Computations are performed using both the wing-body mesh and the embedded tail mesh. Flow variables are matched along the common boundaries between these two mesh systems. Computational results are given for the potential flow around aircraft configurations. The mesh system used is applicable to both free-air configurations and wind-tunnel configurations. It is also applicable for Euler equation finite volume schemes. Author

A84-11594*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

GRID GENERATION IN THREE DIMENSIONS BY POISSON EQUATIONS WITH CONTROL OF CELL SIZE AND SKEWNESS AT BOUNDARY SURFACES

R. L. SORENSON (NASA, Ames Research Center, Moffett Field, CA) and J. L. STEGER (Stanford University, Stanford, CA) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 181-187. refs

An algorithm for generating computational grids about arbitrary three-dimensional bodies is developed. The elliptic partial differential equation (PDE) approach developed by Steger and Sorenson and used in the NASA computer program GRAPE is extended from two to three dimensions. Forcing functions which are found automatically by the algorithm give the user the ability to control mesh cell size and skewness at boundary surfaces. This algorithm, as is typical of PDE grid generators, gives smooth grid lines and spacing in the interior of the grid. The method is applied to a rectilinear wind-tunnel case and to two body shapes in spherical coordinates. Author

A84-11595#

GRID GENERATION FOR WING-TAIL-FUSELAGE CONFIGURATIONS

A. SHMILOVICH and D. A. CAUGHEY (Cornell University, Ithaca, NY) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 189-197. refs

(Contract N00014-77-C-0033)

An efficient procedure is presented for generating boundary conforming coordinate systems for three-dimensional wing-tail-body combinations. A sequence of conformal and shearing transformations is employed to yield a slotted and nearly orthogonal computational domain. Computational grids for several realistic configurations will be shown to illustrate the capability of the mesh generation procedure. The method should also be easily adapted to allow generation of meshes for other complex configurations. Author

A84-11596#

EFFICIENT TURBOMACHINERY GRID GENERATION USING TRAUPEL'S CONFORMAL MAPPING

S. R. KENNON and G. S. DULIKRAVICH (Texas, University, Austin, TX) IN: Advances in grid generation, Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 199-204. Research supported by the University of Texas. refs

A fast computer code is developed that generates up to four sequentially refined boundary-fitted quasi-orthogonal three-dimensional periodic computational O-type grids applicable to axial turbomachinery flow field calculations. The grid generating technique is based on a sequence of conformal mappings and nonorthogonal coordinate stretching and shearing transformations. A periodic strip of the cascade flow field is mapped conformally onto a deformed oval using the analytic mapping functions developed by Traupel, and one bilinear transformation, the entire sequence being explicit and analytically invertible. The final step of opening the deformed oval into a near rectangle is performed using simple polar coordinates. The near rectangle is transformed to an exact rectangle using nonorthogonal stretching and shearing. This sequence does not require iterative inversion of the mapping functions. It also avoids conformal mapping onto an exact circle that involves use of the Fourier transforms. Consequently, the present grid generation technique is considerably faster than other known techniques, and is applicable to both compressor and turbine realistically shaped cascade geometries. In particular, this technique can generate three-dimensional grids for very thick, closely spaced, highly cambered and highly staggered turbine rotors or stators.

Author

A84-11597#

3-DIMENSIONAL GRID GENERATION WITH APPLICATIONS TO HIGH PERFORMANCE AIRCRAFT

D. C. WILSON (Florida, University, Gainesville, FL) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 205-210. refs

A general method of constructing 3-dimensional grids is developed using straight forward techniques from Trigonometry and Analytic Geometry. The method has the virtue that explicit, yet simple, formulas are used. This procedure allows tight control of grid point location and mesh size. These ideas are then applied to the special case of a high performance aircraft with close-coupled canard. Author

A84-11598*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AN ORTHOGONAL COORDINATE GRID FOLLOWING THE THREE-DIMENSIONAL VISCOUS FLOW OVER A CONCAVE SURFACE

J. R. DAGENHART, (NASA, Langley Research Center, Hampton, VA) and W. S. SARIC (Virginia Polytechnic Institute and State University, Blacksburg, VA) IN: Advances in grid generation; Proceedings of the Applied Mechanics, Bioengineering, and Fluids Engineering Conference, Houston, TX, June 20-22, 1983. New York, American Society of Mechanical Engineers, 1983, p. 211-219. refs

Swept wings designed for laminar flow control exhibit both centrifugal and crossflow instabilities which produce streamwise vortices that can lead to early transition from laminar to turbulent flow in the presence of Tollmien-Schlichting waves. This paper outlines an iterative algorithm for generation of an orthogonal, curvilinear, coordinate grid following the streamlines of the three-dimensional viscous flow over a swept, concave surface. The governing equations for the metric tensor are derived from the Riemann-Christoffel tensor for an Euclidian geometry. Unit vectors along streamline, normal and binormal directions are determined. The governing equations are not solved directly, but are employed only as compatibility equations. The scale factor for the streamline coordinate is obtained by an iterative integration

scheme on a $200 \times 100 \times 5$ grid, while the other two scale factors are determined from definitions. Sample results are obtained which indicate that the compatibility equation error decreases linearly with grid step size. Grids smaller than $200 \times 100 \times 5$ are found to be inadequate to resolve the grid curvature. Author

A84-11855**THE USE OF COMPUTATIONAL FLUID DYNAMICS IN THE SOLUTION OF A NUMBER OF AERODYNAMIC TRANSONIC FLOW PROBLEMS**

M. P. CARR (Aircraft Research Association, Ltd, Manton Lane, Beds., England) IN: World Congress on System Simulation and Scientific Computation, 10th, Montreal, Canada, August 8-13, 1982, Proceedings. Volume 1. Montreal, International Association for Mathematics and Computers in Simulation, 1983, p. 178-180. refs

Attention is called to the significant advances that have been made in recent years in developing theoretical methods for predicting transonic flows over aerodynamic configurations. Two aspects of this are the calculation of the flows over detailed aerodynamic configurations and the development of efficient algorithms for solving the appropriate flow equations. Techniques are described here for solving approximate flow equations over complex configurations together with solution algorithms developed to improve convergence rates of the nonlinear difference equations. The potential equation has been used with the greatest success in solving a range of aerodynamic problems. While there are many existing codes based on analytic grid generation, the requirements for more general configurations suggest some form of numerical multiblock system. C.R.

A84-11856**RECENT PROGRESS IN THE APPLICATION OF FINITE ELEMENT METHODS TO TRANSONIC FLOWS**

W. G. HABASHI (Concordia University, Montreal, Canada) IN: World Congress on System Simulation and Scientific Computation, 10th, Montreal, Canada, August 8-13, 1982, Proceedings Volume 1. Montreal, International Association for Mathematics and Computers in Simulation, 1983, p. 182-184. refs

This paper reviews recent progress in the application of finite element methods to transonic potential flows. The shock capturing capability of the artificial density method is demonstrated. Examples are selected from isolated airfoil cases and from complex flows in rotating turbomachinery such as blade-to-blade and hub-to-shroud flows. Several iterative algorithms are proposed. Necessary modifications to stabilize these schemes in the presence of strong shocks are outlined. Author

A84-11857**NUMERICAL METHODS FOR THREE-DIMENSIONAL INVISCID FLOW COMPUTATIONS**

J.-J. CHATTOT (Matra, S.A., Velizy-Villacoublay, Yvelines, France) IN: World Congress on System Simulation and Scientific Computation, 10th, Montreal, Canada, August 8-13, 1982, Proceedings. Volume 1. Montreal, International Association for Mathematics and Computers in Simulation, 1983, p. 185-188. refs

The two methods presented are a vortex method and a finite difference method for the solution of the Euler equations. These methods can be used to compute three-dimensional inviscid flows past realistic geometric configurations. The results, which are compared with experimental data and other theoretical results, demonstrate the possibilities offered by computational fluid dynamics in analyzing complex flows. Attention is called to the difficulty of assessing the accuracy of the vortex method in terms of cell size on the body and distance between emission points on the separation lines. What is more, it is not clear that the free vortex structure remains stable as the number of emitted particles increases. A significant problem also arises in keeping track of all the particles and eventually eliminating or condensing the older ones in order to maintain the size of the code within the memory bound of the computer and to limit the increase in the central processor unit cost of each new iteration. C.R.

A84-11980#**THEORETICAL AND EXPERIMENTAL INVESTIGATIONS CONCERNING THE GROUND EFFECT ON WINGS WITH FLAPS [THEORETISCHE UND EXPERIMENTELLE UNTERSUCHUNGEN UEBER DEN BODENEINFLUSS AUF TRAGFLUEGEL MIT KLAPPEN]**

K.-W. BOCK (Braunschweig, Technische Universitaet, Fakultae fuer Maschinenbau und Elektrotechnik, Dr.-Ing. Dissertation, 1983, 192 p. In German. refs

The present study is concerned with the effect of the ground on the effectiveness of variable camber flaps at the trailing edge of a wing, taking into account landing flaps and ailerons. The investigation has the objective to improve a vortex method reported by Maskew (1971, 1976) with respect to a number of details. The vortex method is employed in a theoretical study of the conditions existing in the case of wings with flaps near the ground. Questions regarding the geometry of the wing are considered along with the determination of circulation distribution, the determination of the aerodynamic coefficients, and details regarding the computational requirements. A description is provided of measurements of the pressure distribution and forces in the case of a rectangular wing with flaps near the ground. G.R.

A84-11981#**THE INFLUENCE OF THE REYNOLDS NUMBER ON THE AERODYNAMIC PARAMETERS OF WING PROFILES NEAR GROUND [UNTERSUCHUNGEN ZUM EINFLUSS DER REYNOLDS-ZAHLE AUF DIE AERODYNAMISCHEN BEIWERTE VON TRAGFLUEGELPROFILIEN IN BODENNAEHE]**

E. BEESE (Bochum, Ruhr-Universitaet, Fakultae fuer Maschinenbau, Dr.-Ing. Dissertation, 1982, 183 p. In German. refs

A theoretical and experimental investigation of the effect of Reynolds number (Re) on the parameters c_A , c_W , and c_M in the steady 2D incompressible flow around a wing profile near the ground is presented. The Navier-Stokes equations are approximated by an asymptotic interaction theory for large Re , with special attention to the boundary layer which forms at the ground due to the profile-induced velocities. The extreme case in which the distance of the wing profile to the ground approaches zero is considered separately. The validity of the quantitative results is verified by experiments involving a model moved rapidly over a fixed ground. It is shown that ground effects can be neglected in cases with lift, but must be taken into account in wind tunnel simulations of cases with downward pressure. Numerous graphs and drawings illustrate the results. T.K.

A84-12037#**FINITE DIFFERENCE COMPUTATION OF WAVE DRAG AND PRESSURE ON SLENDER BODIES OF REVOLUTION AT TRANSONIC SPEEDS WITH ZERO-LIFT**

X. LI and S. LUO (Northwestern Polytechnical University, Xian, People's Republic of China) Acta Aeronautica et Astronautica Sinica, vol. 4, June 1983, p. 1-12. In Chinese, with abstract in English. refs

Finite difference methods were used to solve the transonic axisymmetric potential equation with large disturbance in the free stream direction and small perturbation in the transverse direction. Attention is confined to slender bodies of revolution at zero-lift, with slender body theory employed to obtain the pressure distribution on the body surface. An exact solution for the Bernoulli equation yields the pressure coefficient, which when integrated over the entire surface provides the zero-lift wave-drag coefficients. Seven different configurations are investigated in order to test the sensitivity of the method to mesh spacings, initial fields, iterative solutions, and relaxation factors. The stability and convergence of line over relaxation potential flow were also studied, showing that the numerical results agree well with predictions. M.S.K.

02 AERODYNAMICS

A84-12042#

BUZZ IN AXISYMMETRIC SUPERSONIC INLET AND ITS CONTROL

Z. HE and S. ZHANG (Nanjing Aeronautical Institute, Nanjing, People's Republic of China) *Acta Aeronautica et Astronautica Sinica*, vol. 4, June 1983, p. 73-82. In Chinese, with abstract in English. refs

Static pressure fluctuations at the cone surface in the throat of an axisymmetric external compression inlet were examined to detect the cause of buzz at the inlet and its control in supersonic conditions. The flow was confined to Mach 1.97 for the tests, which also covered angles of attack of 0 and 12 deg. A sharp pressure fluctuation was found, along with the buzz, when the bow shock separated from the cowl lip at 0 deg. The buzz displayed a characteristic frequency of 43.75 Hz. A buzz frequency of 18.75 Hz was obtained at 12 deg as the bow shock at the lee side of the cone vibrated abruptly and with large amplitude. A specific mass flow permitted through the inlet door eliminated the buzz, stabilized the bow shock, and lowered the amplitude of the pressure fluctuation. M.S.K

A84-12172

AERODYNAMIC FORCES ARISING IN THE BLADE PASSAGES OF TURBOMACHINE IMPELLERS [AERODINAMICHESKIE SILY, VOZNIKAUSHCHIE V MEZHLOPATOCHNYKH KANALAKH RABOCHEGO KOLESIA TURBOMASHINY]

K. F. SHPITALNIKOV and V. K. SHPITALNIKOV (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Legkogo i Tekstil'nogo Mashinostroeniia, Moscow, USSR) *Energetika* (ISSN 0579-2983), Sept. 1983, p. 79-85. In Russian.

The steady-state flow of an ideal gas in a field of centrifugal forces is considered. The absolute velocity of the three-dimensional flow, which is taken to be known, is a function of the path traveled by a gas particle. The path, in turn, depends on the rectangular coordinates x , y , and z . The origin of this coordinate system is a given distance from the axis of rotation of a centrifugal force field system. The y -axis of the accompanying trihedron is placed so that it coincides with the tangential component of the absolute velocity; the z -axis then coincides with the radius of rotation of the centrifugal force field and the x -axis is parallel to the axis of rotation of the system. The method outlined here for determining the aerodynamic forces is based on solutions to the continuity equation, to the system of equations for Euler motion, and to kinematic and thermodynamic relations for turbomachines. C.R.

A84-12350#

THERMAL ENVIRONMENT OF MISSILES IN CAPTIVE FLIGHT

R. K. MATTHEWS, W. K. CRAIN (Calspan Flight Services, Inc., Arnold Air Force Station, TN), R. H. NICHOLS (USAF, Arnold Engineering Development Center, Arnold Air Force Station, TN), and T. E. DURRENBERGER (USAF, Armament Test Laboratory, Eglin AFB, FL) *AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference*, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 10 p. refs

(AIAA PAPER 83-2764)

As part of a technology program to investigate transient aerodynamic heating on externally carried missiles, a wind tunnel and flight test program was conducted using a modified AIM-9E Sidewinder missile. The wind tunnel tests were conducted in the AEDC Aerodynamic Wind Tunnel (A) and the flight tests were made with an F-15 aircraft from Eglin AFB. The same missile, instrumented with heat-flux gages and thermocouples, was used for both test phases. The primary test Mach number was 1.5; however, limited wind tunnel data were obtained at additional Mach numbers of 2.0 and 2.5. Agreement of the wind tunnel and flight data was satisfactory, and comparisons of the data with the turbulent theory were also acceptable. Missile wall temperatures measured during the flight tests approached recovery temperature levels within three minutes from the start of the test run, indicating that recovery temperature is of primary importance in quantifying missile thermal environments. Author

N84-10013 Pittsburgh Univ., Pa.

COMPUTATIONAL ANALYSES OF UNSTEADY FLOW PAST AIRFOILS WITH FLAPPING AND/OR PITCHING MOTION Ph.D. Thesis

S. M. HUANG 1982 159 p

Avail: Univ. Microfilms Order No. DA8305577

This study is aimed at a computational analysis of unsteady flows past airfoils undergoing flapping and/or pitching motion. Numerical solutions were obtained for flow past a flat plate, accelerated flow past a finite plate (rectangular airfoil) undergoing a flapping motion, pitching motion, or combined flapping and pitching motions, and for an accelerated flow past an airfoil with an upward motion. The numerical results of the boundary layer development over a flat plate were in agreement with those in the literature. For accelerated flow past a plate, the plate was first accelerated from the rest with a 15 deg angle of attack. The tangential component of the Reynolds number was increased linearly from 0 to 100, then to 29,000 at very rapid accelerations. Further computations were made for three oscillatory flows. They were caused by a flapping motion, pitching motion and combined flapping and pitching motions of the plate. All of these three cases had the same prescribed temporal variations in the angle of attack and the instantaneous Reynolds number but has different trajectories. Dissert. Abstr.

N84-10014 Notre Dame Univ., Ind.

EXPERIMENTAL STUDIES OF BOUNDARY LAYER TRANSITION ON A SPINNING AND NON-SPINNING AXISYMMETRIC BODY Ph.D. Thesis

J. T. KEGELMAN 1982 219 p

Avail: Univ. Microfilms Order No. DA8305873

An experimental investigation of natural and forced boundary layer transition on a secant ogive nose axisymmetric body was conducted for Reynolds numbers between 315,000 through 1,030,000. Two different modes of instability, a viscosity conditioned Tollmien-Schlichting instability as well as crossflow or inflectional instability were observed and documented. The boundary layer displacement thickness, momentum thickness and shape factors were determined in order to provide a complete data base for testing current transition theories. Wind tunnel freestream turbulence and sound pressure levels were measured to provide an estimate of the freestream disturbance environment. Velocity profiles and pressure distributions were documented and combined with flow visualization data to yield a more complete understanding of the transition processes. A considerable part of this investigation was directed toward the development of the wind tunnel equipment, instrumentation, and computer software necessary to obtain meaningful experimental data. Dissert. Abstr.

N84-10015 Washington Univ., Seattle.

A STUDY OF TRANSONIC NORMAL SHOCK WAVE-TURBULENT BOUNDARY LAYER INTERACTIONS IN AXISYMMETRIC INTERNAL FLOW Ph.D. Thesis

D. OM 1982 191 p

Avail: Univ. Microfilms Order No. DA8304405

An experimental investigation has been carried out in axisymmetric internal transonic flow to obtain mean flow data throughout the interactions produced by single normal shock waves and by multiple normal shock waves with a turbulent boundary layer. The purpose was to study the effects of Mach number, Reynolds number, and confinement of the flow on the interaction. Detailed pitot, static and wall pressure measurements were obtained upstream of, within, and downstream of a single normal shock wave turbulent boundary layer interaction for free stream Mach numbers of 1.48, 1.37 and 1.28 and a constant unit Reynolds number (based on free stream static temperature) of 4.92×10^6 to the 6th power per meter. In the analytical study, an approximate integral viscous in viscous interaction method is presented for calculating the development of a turbulent boundary layer subjected to a single shock induced adverse pressure gradient in an internal axisymmetric flow. Dissert. Abstr.

N84-10016# Cambridge Univ (England).

THE CALCULATION OF STEADY AND UNSTEADY TRANSONIC FLOW IN CASCADES

D S WHITEHEAD 1982 81 p refs

(CUED/A-TURBO/TR-118, ISSN-0309-6521) Avail: NTIS HC A05/MF A01

The steady flow and the unsteady flow in a cascade of compressor or turbine blades are calculated. The flow is assumed to be two dimensional and irrotational, but may be subsonic in some parts of the field and supersonic in other parts. A mesh of triangular finite elements is used. This was chosen because it enables a large number of small elements to be packed into the regions of greatest interest, such as round the leading edges of the blades, with larger elements in regions where there is not much variation. The steady flow equations are then solved by the Newton-Raphson technique. N.W.

N84-10017*# Kansas Univ., Lawrence. Flight Research Lab
A LIFTING SURFACE THEORY IN ROTATIONAL FLOW Topical Report, Jun. 1981 - Dec. 1982

M. J. SHIAU and C. E. LAN Oct 1983 74 p refs

(Contract NAG1-75)

(NASA-CR-172233; NAS 1.26 172233, CRINC-FRL-467-2) Avail: NTIS HC A04/MF A01 CSCL 01A

The partial differential equation for small disturbance steady rotational flow in three dimensions is solved through an integral equation approach. The solution is obtained by using the method of weighted residuals. Specific applications are directed to wings in nonuniform subsonic parallel streams with velocity varying in vertical and spanwise directions and to airfoils in nonuniform freestream. Comparison with limited known results indicates that the present method is reasonably accurate. Numerical results for the lifting pressure of airfoil, lift, induced drag, and pitching moments of airfoil, lift, induced drag, and pitching moments of elliptic, rectangular, and delta wings in a jet, wake, or monotonic sheared stream are presented. It is shown that, in addition to the effect of local dynamic pressures, a positive velocity gradient tends to enhance the lift Author

N84-10018*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AN EXPERIMENTAL INVESTIGATION OF A FREE-TIP ROTOR CONFIGURATION IN A FORWARD FLIGHT WIND-TUNNEL TEST

R. H. STROUB Oct 1983 22 p refs

(NASA-TM-84409, A-9485; NAS 1 15:84409) Avail: NTIS HC A02/MF A01 CSCL 01A

Results from an experimental evaluation of a free-tip rotor are presented. The evaluation included whirl tests and wind tunnel tests up to advance ratios of 0.4. The free tip extended over the outer 5% of the rotor blade and included a passive mechanical controller whose output characteristics were varied. The controller configuration combined with the free tip aerodynamics resulted in higher power requirements, because the tip's pitch angle was 5 to 10 degrees greater than that of the inboard portion of the blade, and its pitching motion capability was considered to be inhibited by frictional forces. Recommendations are included for design features for a follow-on test. Author

N84-10019*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SUBSONIC HIGH-ANGLE-OF-ATTACK AERODYNAMIC CHARACTERISTICS OF A CONE AND CYLINDER WITH TRIANGULAR CROSS SECTIONS AND A CONE WITH A SQUARE CROSS SECTION

M. H. CLARKSON (Florida Univ., Gainesville), G. N. MALCOLM, V. A. BRITTAIN (Florida Univ., Gainesville), and P. A. INTEMANN Aug. 1983 78 p refs

(NASA-TM-84377; A-9392; NAS 1.15:84377) Avail: NTIS HC A05/MF A01 CSCL 01A

Experiments were conducted in the 12-Foot Pressure Wind Tunnel at Ames Research Center on three models with noncircular cross sections. a cone having a square cross section with rounded

corners and a cone and cylinder with triangular cross sections and rounded vertices. The cones were tested with both sharp and blunt noses. Surface pressures and force and moment measurements were obtained over an angle of attack range from 30 deg to 90 deg and selected oil-flow experiments were conducted to visualize surface flow patterns. Unit Reynolds numbers ranged from $0.8 \times 1,000,000/m$ to $13 \times 1,000,000/m$ at a Mach number of 0.25, except for a few low-Reynolds-number runs at a Mach number of 0.17. Pressure data, as well as force data and oil-flow photographs, reveal that the three dimensional flow structure at angles of attack up to 75 deg is very complex and is highly dependent on nose bluntness and Reynolds number. For angles of attack from 75 deg to 90 deg the sectional aerodynamic characteristics are similar to those of a two dimensional cylinder with the same cross section. Author

N84-10020*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif. Aeromechanics Lab.
MODEL HELICOPTER ROTOR HIGH-SPEED IMPULSIVE NOISE: MEASURED ACOUSTICS AND BLADE PRESSURES

D. A. BOXWELL, F. H. SCHMITZ (Army Aviation Research and Development Command, Moffett Field, Calif.), W. R. SPLETTSTOEISSER (DFVLR, Brunswick), and K. J. SCHULTZ (DFVLR, Brunswick) Sep. 1983 36 p refs Presented at the 9th European Rotorcraft Forum, Stresa, Italy, 13-15 Sep (NASA-TM-85850; A-9463; NAS 1 15:85850, USAAVRADCOM-TR-83-A-14) Avail: NTIS HC A03/MF A01 CSCL 01A

A 1/17-scale research model of the AH-1 series helicopter main rotor was tested. Model-rotor acoustic and simultaneous blade pressure data were recorded at high speeds where full-scale helicopter high-speed impulsive noise levels are known to be dominant. Model-rotor measurements of the peak acoustic pressure levels, waveform shapes, and directivity patterns are directly compared with full-scale investigations, using an equivalent in-flight technique. Model acoustic data are shown to scale remarkably well in shape and in amplitude with full-scale results. Model rotor-blade pressures are presented for rotor operating conditions both with and without shock-like discontinuities in the radiated acoustic waveform. Acoustically, both model and full-scale measurements support current evidence that above certain high subsonic advancing-tip Mach numbers, local shock waves that exist on the rotor blades "delocalize" and radiate to the acoustic far-field Author

N84-10021*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

FLIGHT MEASUREMENTS OF HINGED-PLATE WING-SPOILER HINGE MOMENTS

E. B. FRY Sep 1983 23 p

(NASA-TM-84343; A-9282; NAS 1.15 84343) Avail: NTIS HC A02/MF A01 CSCL 01A

Hinge moment of hinged-plate wing spoilers were measured during flight of a twin turboprop airplane modified by the addition of upper and lower wing-surface spoilers. The spoiler-actuating hydraulic cylinders were instrumented to measure the forces required to extend the spoiler panels. Those measurements were converted to moment coefficient form, and are presented as a function of spoiler deployment angle. The hinge-moment data were collected at three flight conditions: with flaps extended at approach speed; with flaps retracted at a low speed; and with flaps retracted at a high speed ($C_{sub L} = 1.4, 1.0, \text{ and } 0.5$). In general, the magnitude of measured spoiler hinge moments were lower than predicted. Furthermore, for upper surface spoilers with flaps extended, the hinge moments increased in a discontinuous manner between spoiler deflection 10 and 10. A R H.

02 AERODYNAMICS

N84-10022* Massachusetts Inst. of Tech., Cambridge.
EIGENMODE ANALYSIS OF UNSTEADY ONE-DIMENSIONAL EULER EQUATIONS Final Report
 M GILES Aug. 1983 19 p refs
 (Contract NAS1-17130; NAG3-9)
 (NASA-CR-172217; NAS 1.26:172217; REPT-83-47) Avail: NTIS HC A02/MF A01 CSCL 01A

The initial boundary value problem describing the evolution of unsteady linearized perturbations of a steady, uniform subsonic flow is analyzed. The eigenmodes and eigenfrequencies of the system are derived and several examples are presented to illustrate the effect of different boundary conditions on the exponential decay rate of the eigenmodes. The resultant implications for the stability and convergence rates of finite difference computations are discussed
 Author

N84-10023# Toronto Univ. (Ontario). Inst for Aerospace Studies.
NUMERICAL ANALYSIS OF DUSTY SUPERSONIC FLOW PAST BLUNT AXISYMMETRIC BODIES
 H SUGIYAMA Aug. 1983 78 p refs
 (UTIAS-267; ISSN-0082-5255) Avail: NTIS HC A05/MF A01

An inverse method was developed for treating gas-particle supersonic flow past axisymmetric blunt bodies. The pure gas flow fields around spheres were first solved numerically for the freestream Mach numbers $M_{\infty} = 10, 6, 4, 3, 2$, and 1.50 . These were found to be in very good agreement with the available results of Van Dyke and Gordon. Then the gas-solid-particle flow in the shock layer around blunt bodies (nearly spheres) were solved for the freestream Mach numbers M_{∞} infinity = 10 and 1.5, with freestream loading ratios $\alpha = 0, 0.2, 0.5$, and 1.0 and particle diameters $\bar{d}_{sub p} = 1, 2, 5$ and 10 microns, respectively. The effects of M_{∞} sub infinity, $\bar{d}_{sub p}$ and α on the shock-layer thickness and the body surface pressures are discussed. The variations of the flow properties along the stagnation and adjacent streamlines are also shown in some detail.
 N.W.

N84-10024* General Dynamics Corp., Fort Worth, Tex.
DEVELOPMENT OF V/STOL METHODOLOGY BASED ON A HIGHER ORDER PANEL METHOD Contract Report, Mar. 1982 - Mar. 1983
 I. C. BHATELEY, G. A. HOWELL, and H. W. MANN Jun. 1983 329 p refs
 (Contract NAS2-11167)
 (NASA-CR-166491; NAS 1.26:166491) Avail: NTIS HC A15/MF A01 CSCL 01A

The development of a computational technique to predict the complex flowfields of V/STOL aircraft was initiated in which a number of modules and a potential flow aerodynamic code were combined in a comprehensive computer program. The modules were developed in a building-block approach to assist the user in preparing the geometric input and to compute parameters needed to simulate certain flow phenomena that cannot be handled directly within a potential flow code. The PAN AIR aerodynamic code, which is higher order panel method, forms the nucleus of this program. PAN AIR's extensive capability for allowing generalized boundary conditions allows the modules to interact with the aerodynamic code through the input and output files, thereby requiring no changes to the basic code and easy replacement of updated modules.
 Author

N84-10025* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF THRUST VECTORING AND WING MANEUVER DEVICES ON TRANSONIC AEROPROPULSIVE CHARACTERISTICS OF A SUPERSONIC FIGHTER
 F. J. CAPONE and D. E. REUBUSH Feb. 1983 88 p refs
 (NASA-TP-2119; L-15526; NAS 1.60:2119) Avail: NTIS HC A05/MF A01 CSCL 01A

The aeropropulsive characteristics of an advanced fighter designed for supersonic cruise were determined in the Langley 16-Foot Transonic Tunnel. The objectives of this investigation were

to evaluate the interactive effects of thrust vectoring and wing maneuver devices on lift and drag and to determine trim characteristics. The wing maneuver devices consisted of a drooped leading edge and a trailing-edge flap. Thrust vectoring was accomplished with two dimensional (nonaxisymmetric) convergent-divergent nozzles located below the wing in two single-engine podded nacelles. A canard was utilized for trim. Thrust vector angles of 0 deg, 15 deg, and 30 deg were tested in combination with a drooped wing leading edge and with wing trailing-edge flap deflections up to 30 deg. This investigation was conducted at Mach numbers from 0.60 to 1.20, at angles of attack from 0 deg to 20 deg, and at nozzle pressure ratios from about 1 (jet off) to 10. Reynolds number based on mean aerodynamic chord varied from 9.24×10^6 to the 6th to 10.56×10^6 to the 6th.
 Author

N84-10026# Air Force Academy, Colo.
EXPERIMENTAL MEASUREMENTS OF WAKE CHARACTERISTICS OF LOW ASPECT-RATIO DELTA AND FLAPPED-PLATE PLANFORMS Technical Note, 1 Jan. - 1 Jun. 1982

C. R. KEDZIE and K. E. GRIFFIN 15 Mar. 1983 44 p refs
 (AD-A130398; USAFA-TN-83-6) Avail: NTIS HC A03/MF A01 CSCL 20D

This report documents the characteristics and location of the wakes for two generic lifting surface planforms. The geometric description locates these wakes as they develop downstream from a low aspect-ratio delta wing and a bent-plate wing. The wakes are graphically depicted at several streamwise locations downstream of these wings with accompanying cross-velocity vector plots to assist in interpreting them. The data used to determine these wake characteristics was obtained by surveying the wings' flow field with a seven-hole pressure probe.

Author (GRA)

N84-10027# Ballistic Research Labs., Aberdeen Proving Ground, Md.

NUMERICAL COMPUTATION OF BASE FLOW FOR A PROJECTILE AT TRANSONIC SPEEDS Final Report

J. SAHU, C. J. NIETUBICZ, and J. L. STEGER Jun. 1983 33 p refs
 (Contract DA PROJ. 1L1-61102-AH-43)
 (AD-A130293; AD-F300274; ARBRL-TR-02495) Avail: NTIS HC A03/MF A01 CSCL 19D

The generalized-Axisymmetric Thin-Layer Navier-Stokes computational technique has been modified for projectile base flow analysis. The resulting new numerical capability is used to compute the entire projectile flow field including the recirculatory base flow. Computed results show the qualitative and quantitative details of the overall base flow structure. Base drag is computed for a secant-ogive-cylinder projectile at an angle of attack of zero and compared with available experimental data and a semi-empirical analysis. Results are also presented which show pressure drag, skin friction drag and total aerodynamic drag for Mach No. $.9 < M < 1.2$.
 Author (GRA)

N84-10028# National Aeronautics Establishment, Ottawa (Ontario). High Speed Aerodynamics Lab.

AEROELASTIC RESPONSE OF AN AIRCRAFT WING TO RANDOM LOADS

B. H. K. LEE Apr. 1983 60 p refs
 (AD-A130476; NRC-21230; NAE-LR-613) Avail: NTIS HC A04/MF A01 CSCL 20D

A method for the prediction of the response of an elastic wing to random loads at flight conditions using rigid model wind tunnel pressure fluctuation measurements is presented. The wing is divided into panels or elements, and the load is computed from measured pressure fluctuations at the center of each panel. A series representation with terms of the correlated noise type is used to curve fit the experimentally determined pressure power spectra. Two methods are used to calculate the random load spectrum: a constant correlation approximation, and an exponential spatially decaying cross-power spectrum model for the pressure.

The coupling between the structural dynamics and aerodynamics of a vibrating wing is taken into consideration using the doublet-lattice method for computing the unsteady aerodynamic forces. The acceleration and displacement response spectra have been computed for the F-4E aircraft for various Mach numbers, dynamic pressures and flight altitudes. The importance of the unsteady aerodynamic loads induced by the vibration of the wing and input load representation is illustrated by comparing the theoretical predictions with results from flight tests.

Author (GRA)

N84-10029# National Aeronautical Establishment, Ottawa (Ontario). High Speed Aerodynamics Lab.

A NEW METHOD OF ESTIMATING WIND TUNNEL WALL INTERFERENCE IN THE UNSTEADY TWO-DIMENSIONAL FLOW

H SAWADA (National Aerospace Lab., Japan) Jan. 1983 61 p refs

(AD-A130475, NRC-21274; NAE-AN-9) Avail NTIS HC A04/MF A01 CSCL 20D

A new method of estimating wall interference in unsteady flow is presented. This method is valid for subcritical flow within the accuracy of the linearized small disturbance theory. The main feature of the method is the use of measured pressure along lines in the flow direction near the tunnel walls. This method is particularly effective in a tunnel with ventilated walls because it does not require the representation of wall characteristics with unreliable mathematical expressions. Results of some numerical examples indicate that the new method produces satisfactory results except for cases when the reduced frequencies are close to the tunnel resonance frequencies. For the case of an airfoil in pitching motion, the method has been used to correct the amplitude of the angle attack and the time lag in the motion.

Author (GRA)

N84-10030# Boeing Vertol Co., Philadelphia, Pa.

A STUDY OF THE AERODYNAMIC INTERACTIONS OF THE TAIL ROTOR AND FIN Final Report, 17 Jul. 1978 - 1 Feb. 1983

P. F. SHERIDAN, E. J. HANKER, JR., and B. B. BLAKE 6 Jun 1983 74 p refs

(Contract DAAG29-78-C-0021)

(AD-A130757; ARO-15710.2-EG) Avail NTIS HC A04/MF A01 CSCL 20D

The results of a wind tunnel investigation of the aerodynamic interaction of the tail rotor and fin are presented. Model loads data were measured for a 1/485 scale model of the YUH-61A. Tests were conducted deep in ground effect at wind speeds ranging from 0 to 45 knots; representative of Nap-of-the-Earth. Flow visualization studies provided additional insight into the flow mechanisms at work such as the ground vortex. Distributional flow characteristics, particularly the location and structure of the main rotor tip vortex, were measured by a hot film probe. A variable fin incidence mechanism was incorporated in the model to measure the integrated flow at the empennage. Adverse fin force and tail rotor power variations are measured as functions of airspeed, wind azimuth, tail rotor thrust and main rotor thrust.

Author (GRA)

N84-10031# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio Computational Aerodynamics Group.

INTRODUCTION TO COMPUTATIONAL AERODYNAMICS Final Report, 5 Jan. - 3 Jul. 1981

W. L. HANKEY Apr. 1983 125 p refs

(Contract AF PROJ. 2307)

(AD-A130717, AFWAL-TR-82-3031) Avail NTIS HC A06/MF A01 CSCL 20D

During the last decade remarkable advances have occurred in our ability to solve the Navier-Stokes equations for complex flows. Algorithms were developed and the speed and capacity of digital computers evolved to permit these advances. This report traces some of the significant features of this new field of Computational Fluid Dynamics (CFD). The objective is to provide an introduction

to CFD for engineers starting in the field. The governing equations are first derived in the divergence form currently in use. The use of numerical methods is first demonstrated by solving the boundary layer equations. Stability and accuracy are then discussed. Several popular algorithms for solving partial differential equations by finite difference are presented. The shock wave structure is then solved by means of one of these algorithms. Numerical techniques for grid generation are discussed along with the general transformation procedure. Self-excited fluid dynamic oscillations encountered in CFD are addressed. It is hoped that by studying these specific topics an engineer can become functional in the field of CFD.

GRA

N84-10032*# Lockheed-Georgia Co., Marietta.

LANN (LOCKHEED, AFWAL, NASA-LANGLEY AND NLR) WING TEST PROGRAM: ACQUISITION AND APPLICATION OF UNSTEADY TRANSONIC DATA FOR EVALUATION OF THREE-DIMENSIONAL COMPUTATIONAL METHODS Final Report, May 1980 - Feb. 1983

J. B. MALONE and S. Y. RUO Wright-Patterson AFB, Ohio AFWAL Feb. 1983 138 p refs Sponsored in part by NASA-Langley

(Contract F33615-80-C-3213; AF PROJ. 2401)

(NASA-CR-174466, NAS 1 26:174466; AD-A130701;

AFWAL-TR-83-3006; LG83ER0075) Avail NTIS HC A07/MF

A01 CSCL 20D

This report describes the LANN (Lockheed, AFWAL, NASA-Langley, and NLR) wind tunnel test program. The objective of this program was to acquire a comprehensive experimental data base on a modern, transport type wing in steady and unsteady transonic flow. Details of the model geometry and structural properties are documented. Initial correlations of portions of this data base with numerical results generated by two state-of-the-art computational aerodynamics computer programs are presented.

Author (GRA)

N84-10033# Pacific Northwest Lab., Richland, Wash

STATUS OF WIND-TURBINE WAKES RESEARCH IN THE FEDERAL WIND ENERGY PROGRAM

D. L. HADLEY and D. S. RENNE May 1983 22 p refs Presented at the Am Solar Energy Soc. Meeting, Minneapolis, 1-3 Jun 1983

(Contract DE-AC06-76RL-01830)

(DE83-013828; PNL-SA-10999; CONF-830622-16) Avail NTIS HC A02/MF A01

The performance of operating large multimegawatt-size wind turbines was investigated. The impact of wind turbine wakes on downwind machines operating in clusters or arrays was assessed. An understanding of the instantaneous structure of a wake in the near wake region behind a large wind turbine, and of the distribution of the wake induced velocity deficits out to 10 diameters downwind of a single machine evolved. A clearer picture of the qualitative nature of the turbulence structure of the wake, and of the characteristics of the vortices induced by the tips of the rotating blade was developed. The complex terrain and resultant complex airflow over the site plays an important role in the downwind structure and reenergizing of the wake that needs to be accounted for in future experiments. The measurement program provides an adequate data base for verifying or improving upon existing numerical models of the wake phenomenon or of array performance.

DOE

N84-11136* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va

FAMILY OF AIRFOIL SHAPES FOR ROTATING BLADES Patent

K. W. NOONAN, inventor (to NASA) 1 Nov. 1983 9 p Filed 25 Jun 1982 Supersedes N82-33372 (20 - 24, p 3389) (NASA-CASE-LAR-12843-1; US-PATENT-4,412,664; US-PATENT-APPL-SN-392096; US-PATENT-CLASS-244-35R; US-PATENT-CLASS-244-35A; US-PATENT-CLASS-416-223R; US-PATENT-CLASS-416-242) Avail: US Patent and Trademark Office CSCL 01A

An airfoil which has particular application to the blade or blades of rotor aircraft such as helicopters and aircraft propellers is described. The airfoil thickness distribution and camber are shaped to maintain a near zero pitching moment coefficient over a wide range of lift coefficients and provide a zero pitching moment coefficient at section Mach numbers near 0.80 and to increase the drag divergence Mach number resulting in superior aircraft performance.

Official Gazette of the U.S. Patent and Trademark Office

N84-11137 Iowa State Univ. of Science and Technology, Ames
A GENERALIZED SOLUTION TECHNIQUE FOR THE PARABOLIZED NAVIER-STOKES EQUATIONS Ph.D. Thesis

E. VENKATPATHY 1982 102 p
Avail: Univ Microfilms Order No. DA8307796

A general parabolized Navier-Stokes equation solver is developed and the supersonic viscous flow around a flat slab delta wing and the flow around the Space Shuttle Orbiter are solved. The generalized marching scheme requires initial data which are obtained by computing the flow in the blunt nose region. This region is computed for the two problems using an axisymmetric or three dimensional unsteady Navier-Stokes solver. The use of a generalized transformation reduces the computational region required for the three dimensional blunt nose region and this effectively reduces the computational time required to solve the flow around the blunt nose region. An algebraic grid clustering scheme, which has a potential to be developed into a grid generation scheme, clusters the grid points around the wing tip and wing body juncture regions and describes the Space Shuttle Orbiter body shape accurately. A simple solution surface generation scheme, outlined here, allows the user to march the solution along the most appropriate direction. Dissert. Abstr.

N84-11138 Cincinnati Univ., Ohio.
A CONFORMAL MAPPING TECHNIQUE FOR NONSYMMETRIC POTENTIAL FLOWS WITH SEPARATION Ph.D. Thesis

P. J. HEINK 1982 129 p refs
Avail: Univ. Microfilms Order No. DA8307512

A technique is described for efficiently solving for the potential flow past an arbitrary body with separation. The solution involves a conformal mapping using the Schwartz-Christoffel transformation generalized for curved elements. Solutions and an airfoil with a soiler. The technique is also adapted for use in solving for the flow past a parabola with separation on one side. For this case, there is a study of smooth separation. While the technique is shown to be second-order accurate, there is also a discussion of the nature of the singularities in the transformation which the implementation of higher order methods. Dissert. Abstr.

N84-11139 Mississippi State Univ., State College.
THE USE OF AN ADAPTIVE GRID IN A SOLUTION OF THE NAVIER-STOKES EQUATIONS FOR INCOMPRESSIBLE FLOW Ph.D. Thesis

L. M. FREEMAN 1982 76 p
Avail: Univ Microfilms Order No. DA8307452

An adaptive-grid algorithm is used for the computational solution of the incompressible two-dimensional Navier-Stokes equations. The governing equations are written in the non-conservative, primitive-variables formulation. In each time step the Navier-Stokes equations are solved by a point SOR method and a new grid is generated for use in the next time step. The basic coordinate generation method used in this study is that of Thompson, et al

for arbitrary, curvilinear coordinates in two dimensions. The adaptive-grid algorithm calculates flow field gradients and modifies the coordinate line attraction parameters based on the magnitude of the gradients. Grid point speeds are calculated based on grid point location history. The Navier-Stokes system of governing equations consists of two momentum equations and a Poisson pressure equation for advancing the pressure in time. The pressure equation is obtained by taking the divergence of the momentum equations. Dissert. Abstr.

N84-11140 Wichita State Univ., Kans
LOW ASPECT RATIO WING/BODY VORTEX INTERACTION AT LARGE ANGLES OF PITCH AND YAW Ph.D. Thesis

D. MANOR 1983 148 p
Avail: Univ. Microfilms Order No. DA8308660

The effects of large angles of pitch and yaw on the performance and stability of double-delta wing, cylindrical body, and wing/body configurations were determined experimentally using six-component force measurements, surface oil flow and wake total pressure surveys. The force measurements results are presented in graphical form, and flow-field photographs of the wake and surface oil flow are also included. The wake total pressure information reveals details of the vortex structure not available with other methods. This information includes size, location, shape, and total pressure coefficient. Sideslip angle resulted in a decreased stall angle of attack lower C sub LMAX, enhancement of post-stall lift recovery, and increased upwind vortex sheet size and decreased downwind vortex size. As angle of attack increased, vortex merging caused a reduction in sideforce. Adding the body to the wing increased the levels of adverse rolling and yawing moments at the stall. Dissert. Abstr.

N84-11141* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va

REYNOLDS NUMBER TESTS OF AN NPL 9510 AIRFOIL IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL
R. V. JENKINS Nov. 1983 87 p refs
(NASA-TM-85663; L-15585; NAS 1.15:85663) Avail: NTIS HC A05/MF A01 CSCL 01A

An investigation of the NPL 9510 airfoil was conducted in the Langley 0.3-Meter Transonic Cryogenic Tunnel over the following ranges of test conditions: Mach number of 0.35 to 0.82, total temperature of 94 K to 300 K, total pressure of 1.20 to 5.81 atm, Reynolds number based on airfoil chord of 1.34×10^6 to the 6th power to 48.23×10^6 to the 6th power, and angle of attack of 0 deg to 6 deg. The drag creep previously reported by the British National Physics Laboratory at low Reynolds numbers was also found to be present at high Reynolds numbers; the section drag coefficient continued to decrease even at the highest Reynolds number tested. Tests made close to free-stream saturation did not produce altered aerodynamic coefficients due to condensation effects. Author

N84-11142* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AIRLOADS ON BLUFF BODIES, WITH APPLICATION TO THE ROTOR-INDUCED DOWNLOADS ON TILT-ROTOR AIRCRAFT
W. J. MCCROSKEY, P. SPALART, G. H. LAUB, M. D. MAISEL, and B. MASKEW (Analytical Methods, Inc., Bellevue, Wash.) Sep. 1983 15 p refs Presented at the 9th European Rotorcraft Forum, Stresa, Italy, 13-15 Sep. 1983 Prepared in cooperation with Army Research and Technology Labs., Moffett Field, Calif. (NASA-TM-84401; A-9474; NAS 1.15:84401; AVRADCOM-TR-83-A-12) Avail: NTIS HC A02/MF A01 CSCL 01A

The aerodynamic characteristics of airfoils with several flap configurations were studied theoretically and experimentally in environments that simulate a wing immersed in the downwash of a hovering rotor. Special techniques were developed for correcting and validating the wind tunnel data for large blockage effects, and the test results were used to evaluate two modern blockage effects, and the test results were used to evaluate two modern computational aerodynamics codes. The combined computed and

measured results show that improved flap and leading-edge configurations can be designed which will achieve large reductions in the downloads of tilt-rotor aircraft, and thereby improve their hover efficiency. Author

N84-11143* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ROTOR/BODY AERODYNAMIC INTERACTIONS

M. D. BETZINA, C. A. SMITH, and P. SHINODA Oct. 1983 39 p refs
(NASA-TM-85844; A-9500; NAS 1.15:85844;
USAAVRADCOM-TR-83-A-12) Avail. NTIS HC A03/MF A01
CSCL 01A

A wind tunnel investigation was conducted in which independent, steady state aerodynamic forces and moments were measured on a 2.24 m diam. two bladed helicopter rotor and on several different bodies. The mutual interaction effects for variations in velocity, thrust, tip-path-plane angle of attack, body angle of attack, rotor/body position, and body geometry were determined. The results show that the body longitudinal aerodynamic characteristics are significantly affected by the presence of a rotor and hub, and that the hub interference may be a major part of such interaction. The effects of the body on the rotor performance are presented J.M.S.

N84-11144* Lockheed-California Co., Burbank.

EFFECTS OF NACELLE CONFIGURATION/POSITION ON PERFORMANCE OF SUBSONIC TRANSPORT Final Report

L. H. BANGERT, D. K. KRIVEC, and R. N. SEGALL Washington
NASA Nov. 1983 193 p refs
(Contract NAS1-16644)
(NASA-CR-3743; NAS 1.26:3743; LR-30436) Avail. NTIS HC
A09/MF A01 CSCL 01A

An experimental study was conducted to explore possible reductions in installed propulsion system drag due to underwing aft nacelle locations. Both circular (C) and D inlet cross section nacelles were tested. The primary objectives were: to determine the relative installed drag of the C and D nacelle installations, and, to compare the drag of each aft nacelle installation with that of a conventional underwing forward, drag of each aft nacelle installation with that of a conventional underwing forward, pylon mounted (UTW) nacelle installation. The tests were performed in the NASA-Langley Research Center 16-Foot Transonic Wind Tunnel at Mach numbers from 0.70 to 0.85, airplane angles of attack from -2.5 to 4.1 degrees, and Reynolds numbers per foot from 3.4 to 4.0 million. The nacelles were installed on the NASA USB full span transonic transport model with horizontal tail on. The D nacelle installation had the smallest drag of those tested. The UTW nacelle installation had the largest drag, at 6.8 percent larger than the D at Mach number 0.80 and lift coefficient (C sub L) 0.45. Each tested configuration still had some interference drag, however. The effect of the aft nacelles on airplane lift was to increase C sub L at a fixed angle of attack relative to the wing body. There was higher lift on the inboard wing sections because of higher pressures on the wing lower surface. The effects of the UTW installation on lift were opposite to those of the aft nacelles. Author

N84-11145* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

A COMPUTER PROGRAM FOR ESTIMATING THE AERODYNAMIC CHARACTERISTICS OF NACA 16-SERIES AIRFOILS

C. M. MAKSYMUK and S. A. WATSON Sep. 1983 118 p
(NASA-TM-85696; NAS 1.15:85696) Avail. NTIS HC A06/MF
A01 CSCL 01A

A computer program written in a table "look-up" format, is presented which provides a comprehensive data base on NACA 16-series airfoils. The geometry covered is limited to cambers for a design-lift coefficient from 0.0 to 0.7 and thickness ratios from 4 to 21%. The data include Mach numbers from 0.3 to 1.6, angles of attack from -4 to 8 degrees, and lift coefficients from 0.0 to 0.8. Extrapolation is used to obtain data from Mach numbers,

angles of attack, and lift coefficients beyond those for which data are available. A routine to adjust the lift and drag coefficients beyond stall is included. The uses and limitations of the program are also discussed. A.R.H.

N84-11146* United Research Corp., Santa Monica, Calif.

NONPERIODIC FLUCTUATIONS INDUCED BY STATIONARY SURFACE WAVINESS ON A SEMI-INFINITE PLATE Final Report

H. L. ROGLER and C. T. CHEN Arnold AFS, Tenn AEDC
Jul. 1983 43 p refs
(Contract F40600-79-C-0002)
(AD-A130820, AEDC-TR-83-10) Avail. NTIS HC A03/MF A01
CSCL 20D

An analytical/numerical study of flow over an aerodynamic model or vehicle with surface waviness illustrates how surface waviness can generate several families of waves. The classical Kelvin-Helmholtz solution for irrotational flow over a wavy wall is extended to include the effects of the leading edge of a semi-infinite plate. The solution, obtained by conformal mapping and integral transforms, shows that a monochromatic surface waviness can generate a spectrum of standing waves with a continuum of x-wavenumbers, as well as the Kelvin-Helmholtz solution. Downstream of the leading edge, each of those standing waves decays exponentially in the streamwise direction and oscillates sinusoidally in the direction normal to the plate. These standing waves satisfy the usual boundary conditions on a flat plate, although they are initiated by the combined effects of the waviness of the wall and the leading edge. The spectrum depends upon the phase of the surface waviness with respect to the leading edge. Far downstream of the leading edge, only the Kelvin-Helmholtz solution remains. Upstream of the leading edge, the flow field can be represented as a superposition of exponentially-growing standing waves. The theory for flow over a stationary wavy wall is applicable to the case of flow over a traveling wavy wall if the velocity is properly nondimensionalized and the phase of the surface waviness is replaced by the product by frequency and time. Author (GRA)

N84-11147* Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div

SOLUTION OF A MINIMUM PROBLEM IN AIRCRAFT WING THEORY

K. NICKEL 19 Jul. 1983 14 p Transl into ENGLISH from Z
Angew. Math. Mech. (East Germany), v. 31, no. 3, Mar. 1951 p
72-77
(AD-A131070, FTD-ID(RS)T-0820-83) Avail. NTIS HC A02/MF
A01 CSCL 20D

The third fundamental problem of Prandtl's theory of the supporting line is extended to the case of a finite number of linear supplementary conditions, and solved. Three examples demonstrate cases which occur in practice, with such supplementary conditions. Author

N84-11148* Aerospace Corp., El Segundo, Calif. Aerophysics Lab

MACH REFLECTION FLOW FIELDS ASSOCIATED WITH STRONG SHOCKS

H. MIRELS 25 Jul 1983 67 p refs
(Contract F04701-82-C-0083)
(AD-A131384; TR-0083(3785)-1, SD-TR-83-50) Avail. NTIS HC
A04/MF A01 CSCL 20D

The Mach reflection associated with the passage of a shock wave over a wedge is treated in the limit of an ideal gas and a strong shock. In this limit, flow properties are functions only of wedge angle theta and the ratio of specific heats gamma. Numerical results are presented for gamma = 9/7, 7/5, and 5/3. Wedge angles are noted at which the transition from regular to double-Mach, to complex-Mach, and to simple-Mach reflection occurs. Characteristic velocities in the recirculation region associated with Mach reflection are estimated. Local surface pressure maxima, at the upstream and downstream edge of the recirculation region, are also estimated. The scale of the recirculation region increases with decrease in gamma, in accord

with experimental observations. The wedge solution is used on a piecewise basis to estimate height-of-burst (HOB) flow fields. Normalized results are presented for HOB triple-point trajectory and surface pressure variation with range. The present results provide a convenient characterization of Mach reflection flow fields associated with both wedge and HOB flows. Validation of the HOB solution, however, is needed. GRA

N84-11149# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.

WIND TUNNEL WALL INTERFERENCE Final Report, 1 Apr. 1977 - 31 Mar. 1982

D. B. BLISS Apr. 1983 20 p refs

(Contract AF-AFOSR-3337-77; AF PROJ. 2307)

(AD-A131396; AFOSR-83-0655TR) Avail: NTIS HC A02/MF A01 CSCL 20D

The aerodynamic behavior of an isolated finite length slender slot in a wind tunnel wall was analyzed. Numerical and analytical solutions were obtained relating the pressure differential to the average flow rate through the slot as a function of slot geometry for subsonic and supersonic flow. These solutions apply to the cases of linear and quadratic behavior corresponding to small and large slot flow rates. The analysis was extended to include the effect of an imposed pressure gradient along the slot. The results obtained are applicable to low aspect ratio holes as well as slots, and thus provide insight into the behavior of both slotted and perforated walls. The pressure gradient effect on holes was found to introduce a pressure tunnel walls. The effect of aerodynamic interference between holes in a perforated wall was studied for two- and three-dimensional configuration using a wavy wall model problem. It was found that the interference effect between wall elements is relatively local over a wide range of parameters, thereby allowing it to be represented by an additional term in the average wall boundary condition. The interference effect takes the form of a streamline curvature term. The concept of a compliant wall wind tunnel was explored by analysis of a model problem to demonstrate a particular flexible wall concept. In the area of adaptive wall winds tunnels, a method was developed which shows how control adjustments should be made to converge very rapidly to interference-free conditions. GRA

N84-11150# ARO, Inc., Arnold Air Force Station, Tenn.
A STEADY-STATE THERMAL MODEL FOR ANALYSIS OF INCIDENT ICING ON AN AIR FOIL LEADING EDGE Final Report, Jan. 1981 - Sep. 1982

J. L. FERGUS, JR AEDC Jul. 1983 57 p refs

(AD-A131207; AEDC-TR-83-2) Avail: NTIS HC A04/MF A01 CSCL 08L

A steady-state thermal model was developed for analysis of incident icing on the leading edge of wings, fins, or inlets of small missiles or drones at subsonic flight conditions. The model was found to be helpful in predicting the effects of liquid water content on the leading-edge surface temperature and on the free-stream static temperature in interpreting incipient icing test results. Model description, model validation, model behavior, and examples of model applications are presented. Author (GRA)

N84-11151# National Aerospace Lab, Amsterdam (Netherlands). Vlietugen Hoofafdeling.

EXPERIMENTAL VORTEX ANALYZER

J. M. VANDERLAAN 21 Jan. 1982 8 p refs In DUTCH; ENGLISH summary Presented at Ned. Elektron - en Radiogenootschap, 12 Nov. 1981

(NLR-MP-82006-U) Avail: NTIS HC A02/MF A01

A measuring system for detection and analyses of aircraft wake vortices in the approach zone of a runway was developed. It consists of propeller anemometers, a data acquisition unit, a quick look monitor, and a Nova minicomputer with a real time vortex detection program. Wake vortices are also described. The analyzer gives a good insight into wake vortices behavior in the domain close to the runway. Author (ESA)

AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

A84-10416

THE NATIONAL AIR-SPACE SYSTEM CONTINGENCY PLAN

R. H. THRONE (FAA, Air Traffic Service, Washington, DC) Energy (UK) (ISSN 0360-5442), vol. 8, Aug.-Sept. 1983, p. 643-652

The development, coverage, and application of a National Air Traffic Control Contingency Plan designed for use when the 11,000 ATCs in the U.S. went on strike are described. The Plan, initiated by the FAA, was intended to be available before the union contract terminated. Consideration was given to the remaining work force, the priorities of the air services, and maximization of the aircraft movement. Concomitantly, the number of control commands necessary for each aircraft was minimized, a factor that depended on aircraft spacing, both laterally and vertically. Care was taken not to disrupt foreign airline service and thereby precipitate retaliatory actions. Supplementary ATCs were obtained by selecting ATCs who had recently moved up to management and existing supervisors. Actions were coordinated with military and medical planners to order the priority flights, and predetermined altitude separations were configured between cities. Command posts were identified, including personnel, and the criteria and time limits for approval of flight plans were codified. M.S.K.

A84-10707

LIFE SUPPORT SPO IMPROVEMENTS TO THE ACES II SEAT

J. BAINTER, S. ROBERTS, V. FERRY, M. HIGGINS, J. KICK, D. CHASE, J. OLAVARRIA, M. FELMLEY, D. WILHOIT, D. HUDSON (USAF, Aeronautical Systems Div., Wright-Patterson AFB, OH) et al IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 3-6.

Design features of the Advanced Concept Ejection Seat (ACES) II for fighter aircraft are described. Reliability in the seat is enhanced by multiple mode ejection capabilities, a gyro controlled vernier rocket for low speed stabilization, a mortar-deployed parachute, a seat drogue system, and a single point release system for emergency egress. All ACES II subsystems are controlled by electronic components. The seat also features a limb restraint system to prevent flail injuries, an automatic inflation modulation parachute, and an advanced ejection sequencer. ACES II provides a catapult-to-parachute deployment time of 0.6 sec, a 50 percent improvement over ACES I timing. D.H.K.

A84-10714

CF-18 RIGID SEAT SURVIVAL KIT (RSSK) - GLOBAL PHILOSOPHY

J. A. FIRTH and J. C. STEFFLER (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 47-49.

The design and contents of the Canadian Forces CF-18 rigid seat survival kit (RSSK) for ejection seat-equipped aircraft are described. The fiberglass body is molded to form a contoured seatback during normal use, and contains apparatus to interface the seat occupant with the aircraft oxygen and communication systems. The emergency oxygen supply in the seat is activated during ejection, when the hook-up to the aircraft air supply is automatically disconnected. The RSSK contains either a sleeping bag or liferaft, depending on the underlying terrain for the flight, a survival fabric, an 18 ft drop lanyard, a first aid kit, tissues, aluminum foil, a locator beacon, an ax, and food packets. Airborne tests have demonstrated the effectiveness of deployment procedures. D.H.K.

A84-10720**DEVELOPMENT OF HELICOPTER UNDERWATER ESCAPE TRAINING FOR AIRCREW AND PASSENGERS**

J. CROSS (Robert Gordon's Institute of Technology, Aberdeen, Scotland) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 95-101.

Survival training at the Offshore Survival Center, Aberdeen, Scotland, is described, with an emphasis on helicopter underwater escape training programs. The programs are mainly used to train crewmembers and workers who make trips to and from North Sea oil well platforms. The fast weather changes in the area increase the danger of helicopter capsize, even after a controlled descent. The Center has a 'dunker' device that mechanizes a capsize event, and specific attention is devoted to panic situations, training for crash preparation, actions in relation to survival equipment, and escape from a capsized helicopter. Account is also taken of procedures to be followed when a life jacket accidentally inflates. Statements from rescues following actual at-sea ditching have confirmed the effectiveness of the programs.

D.H.K.

A84-10722**IN-FLIGHT RESCUE CONCEPT FOR COMBAT HELICOPTER CREWS-DEVELOPMENT AND GROUNDTESTS**

U. SCHMIDT (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick, West Germany) and R. OLIVA IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 114-121. Research supported by the Bundesministerium der Verteidigung refs

The results of DFVLR research on in-flight ejection for crewmembers of military attack helicopters are reported. Ground trials were run to assure blade severance, with successful, directed throw of the rotor blades being achieved with a pyrotechnical device. An integrated in-flight rescue system ejection seat was tested with dummies. Precise control of the trajectories of the severed rotor components was demonstrated, as was the rocket-propelled ejection seat's ability to stably lift the crewmember a safe distance for parachute deployment. Actual radio-controlled flight tests of the system are recommended.

D.H.K.

A84-10728**UNASSISTED THROUGH CANOPY EJECTION EXPERIENCE**

B. A. MILLER (Martin-Baker Aircraft Co., Ltd., Higher Denham, Middx., England) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 146-149

Injuries sustained by pilots during through-canopy ejections from fighter aircraft cockpits have often been attributed to the effects of penetration. Further investigation has suggested, however, the possibly greater significance of such factors as harness design, sitting platform configuration, etc. It is suggested, in light of the approximately 1000 through-canopy ejections reported to date, that the use of correctly matched canopy penetrators, a powerful catapult, a secure harness, a stable low resonance sitting platform, adequate seat-canopy clearance, and cast acrylic no more than 9 mm in thickness, will ensure a high level of safety in future through-canopy ejections.

O.C.

A84-10730**EJECTION THROUGH A REINFORCED CANOPY TRANSPARENCY**

F. B. BURKDOLL (Explosive Technology, Inc., Fairfield, CA) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 158-160

Attention is given to the development of a through-canopy ejection system's transparency fragmentation mechanism, which was required to explosively cut through two reinforcing longitudinal Dacron strips. Cutters were designed to provide maximum attenuation of shock, and to contain or outwardly deflect all fragments of the transparency that would be generated by the

detonation. Tests conducted with a canopy/seat simulator using a mannequin successfully demonstrated the system.

O.C.

A84-10731**FRAGILIZATION SYSTEMS FOR AIRCRAFT CANOPIES**

G. DUPIN (Avions Marcel Dassault-Breguet Aviation, Vaucresson, Hauts-de-Seine, France) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 161-164.

Attention is given to three types of fighter aircraft canopy fragilization systems developed for use during pilot ejection from Jaguar, Mirage F1, Mirage 2000, and Alpha-Jet aircraft. All three systems employ a small amount of the explosive MDC to create a series of cracks or cuts in the canopy transparency, whose resulting fragments will not injure the pilot after ejection. The explosive charge must also not generate a pressure rise within the cockpit greater than the pilot can tolerate. Two of the three fragilization systems were designed for the specific demands of two-seat fighter aircraft canopy geometries.

O.C.

A84-10733**COMPUTERIZED PARACHUTE DATA BASE SYSTEM**

T. BOZACK (U.S. Naval Weapons Center, China Lake, CA) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 172-178.

The Naval Weapons Center Aerosystems Department has developed a Computerized Data Base System containing data from over 4,000 parachute tests. This Data Base System allows fast, efficient, random access to a broad range of parachute test data. These data include comprehensive information on parachute configurations, test conditions, and test results. Information from this data can be presented in a range of formats which can be easily read by anyone familiar with basic parachute terminology. Data can be outputted in a variety of standard tabular formats or in special purpose reports tailored to meet user needs. Also available are high quality graphic outputs including standard x-y plots, histograms, and pie charts. In addition to data storage and retrieval, the data base has provisions for statistical analysis using an extensive library of statistical techniques. This data base is particularly useful as a research tool for the parachute designer.

Author

A84-10738**AN INVESTIGATION OF THE FATALITY RATES FOR DIFFERENT CANOPY MODES OF EJECTION**

J. E. VETTER (U.S. Navy, Naval Weapons Engineering Support Activity, Washington, DC) and G. R. HERD IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 207-211

The results of comparative studies of the incidence of fatalities in through-the-canopy and jettison canopy modes of escape from an aircraft are discussed. Analyses have been performed to relate fatalities to airspeed, altitude, number of seats, ejection sequence, and severity of injury. It was found that the two ejection modes have not been analyzed with equal data bases, and that the mode used and type of injury varies with the model of aircraft, the airspeed, and the time of ejection. It is noted that the pilot does not usually have time to plan for ejection. The highest fatality rates at airspeeds below 200 kn and below 200 ft altitude are associated with a nose down, bank angle greater than 45 deg.

D.H.K.

A84-10740**RECOVERY BY ACES II**

A. B. MCDONALD (Douglas Aircraft Co., Long Beach, CA) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 227-231.

This paper describes the recovery system used in the USAF-McDonnell Douglas ACES II ejection seat and provides

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details of the design and operation of the recovery parachute. The critical ejection seat performance requirement is for safe recovery in ejections close to the ground. The ACES II recovery system is specifically configured to provide efficient performance throughout the low-altitude regime. Primary recovery system concepts include the use of different operating modes for high and low speeds, the use of stabilization to control the recovery force vector, and the use of a reefed recovery parachute. In the reefing technique used, the duration of effective reefing increases with deployment speed. This increases the efficiency of the recovery system as the recovery parachute is deployed at considerably higher speeds than would otherwise be acceptable

Author

A84-10741

FLAIL, TUMBLE AND WINDBLAST

G. R. HERD IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 237-240.

The experimental method to be used to analyze ejection seat encounters with flail, windblast, and tumble phenomena using data from incidents that occurred between 1969-1979 are described. The data were taken from Medical Officer Reports/Flight Surgeon Reports, and were scanned for only survivors of ejections. Attention will be focused on the population of seat types and their operational characteristics. The total number of ejectees and reported flail, windblast, and tumble are grouped according to seat type and fixed speeds. Plots are going to be drawn on Weibull probability paper. Preliminary analysis has indicated that the sensitivity of ejectees to flail, tumble, and windblast is a function of airspeed at speeds over 150 kn. Data below 150 kn requires further investigation for valid analysis to be performed.

M.S.K.

A84-10743

THE PRODUCTION OF AIRCREW FATALITIES IN NAVY EJECTION SEAT EQUIPPED AIRCRAFT

F. C. GUILL (U.S. Naval Air Systems Command, Washington, DC) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 257-261.

An ongoing program to identify the causal factor patterns in ejection seat fatalities, in ejections outside of the design envelope, the patterns of nonejections, and to discover any relationships between delayed in-envelope ejections and ejections that cross the boundary of the ejection seat performance envelope is described. The data is being gathered from flight surgeon and medical officer reports, which are often subject to personal biases and incomplete information. It has been found that only 18.6 percent of aircrewman who do not eject in ejection-level emergencies survive. A total of 40.6 percent of all ejections occur below 500 ft terrain altitude, a height at which 36.4 percent survive with ejection. Few low altitude ejections follow in-flight emergencies above 10,000 ft altitude. The data indicate that fatalities are associated with late ejection or failure to initiate escape procedures in time.

M.S.K.

A84-10744

A LOOK AT THE 'EAGLE' PARACHUTE - AN INTERESTING UNIQUE PERSONNEL PARACHUTE OF THE 1940'S

D. GOLD (U.S. Naval Weapons Center, China Lake, CA) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 262-275.

The history and performance features of the Eagle personal parachute, patent granted 1938, are presented. The Eagle had a flat canopy with a flat-circular form, as well as two projection sections pointed 45 deg rearward relative to the parachutists' shoulder positions. A cascade suspension, similar to present-day ram air parachutes, was used. A forward glide rate of 5-8 mph was afforded, together with a descent rate of 8-12 fps. The Eagle was employed by Forest Service smokejumpers, who employed a static line when jumping, and by professional parachutists because it was steerable. Widespread use was dampened by the high

opening shock. Production was terminated in 1950, although significant reductions in production were experienced in 1945, when military parachute contracts ended.

M.S.K.

A84-10745

A STUDY OF POST-EGRESS PROCEDURES AND TECHNIQUES CONDUCTED TO INCREASE AIRCREW SURVIVAL FOLLOWING EMERGENCY ESCAPE OVER WATER

F. H. RICHARDS (U.S. Naval Weapons Center, China Lake, CA) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 276-283.

This paper describes the continuation of a study which concluded that parachute entanglement is the most serious in-water hazard affecting aircrew survival following emergency escape over water. Associated with this hazard is the uncertainty among aircrew members concerning nonstandardized emergency escape procedures contained in various Navy flight manuals and taught at their quadrennial water survival training sessions. The objective of this study was to increase aircrew survival by developing a standardized set of post-egress procedures which an aircrew member should employ to avoid parachute entanglement in the water. Ejection and bailout data were first gathered, analyzed, and assessed to develop a test protocol for the program. Following preliminary tests to determine the effects of survival equipment on aircrew members in a semi-controlled water environment, over-water parachute jump tests were conducted to evaluate various sets of post-egress procedures and parachute disentanglement techniques. From the results of these tests, standardized procedures and techniques were established which should improve aircrew survival.

Author

A84-10746

FUTURE PARACHUTE TEST AND EVALUATION CAPABILITY AT THE NAVAL WEAPONS CENTER

W. K. C. FUNG and D. R. STAPLETON (U.S. Naval Weapons Center, China Lake, CA) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 284-288.

Planned improvements in parachute testing at the Naval Weapons Center (NAWPCEN) are reviewed. The efforts will center around improved data acquisitions systems, upgraded human analog simulation capability and overall parachute testing and evaluation support capability. A VAX/11-780 computer has been obtained, together with appropriate software for real-time data acquisition, a bubble-memory man-rated data acquisition system, and rawinsonde balloon capability. Developmental work is proceeding on sensors for monitoring parachute performance parameters, man-rated biosensors, an air catapult device, an aircraft pod for carrying test parachutes and human analogs, and a low-speed aerodynamic test system. A remotely piloted F-4 aircraft, a high speed permeability tester, a high speed material tester, and an environmental simulation chamber will also be acquired. Two buildings will be constructed for packing parachutes and payloads and housing the biomedical laboratory and engineering test facilities.

M.S.K.

A84-10747

BETWEEN EJECTION AND INJURY

C. C. BETTS (Colorado Air National Guard, CO) and M. HILES (Akron, University, Akron, OH) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 289-292.

An approach which jointly considers the comfort efficiency and ejection acceleration, the leading cause of ejecting crewmember injury, in the design of aircraft ejection seats is described. The ejection phases are categorized into initial impact and acceleration to peak and deceleration to chute opening. A shock absorbing seat section 12 x 10 in. sq could be inserted into all existing aircraft to ameliorate the effects of initial impact. Since the body acts in a viscoelastic mode during ejection acceleration, with

different parts of the body in different positions and accelerating at different rates, shear waves are generated in the soft tissue surrounding the bones. The experience is similar to shock waves transmitted throughout the body during running. It is suggested that developing a polymer formulated as a molecular analog of the heel pad will provide a cushion that will reduce the energy input to a tolerable level if installed as a seat. M.S.K.

A84-10748

THE CORRELATION AND DESCRIPTION OF WINDFLAIL INJURY MECHANISMS IN THE WINDBLAST ENVIRONMENT

S. D. SMITH-LAGNESE and L. E. KAZARIAN (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 293-296. refs

A biomechanical assessment is applied to classify extremity windblast injuries incurred during seat ejection from an aircraft in order to identify the causative factors for the injuries. Data from ejections from F-4 aircraft during 1967-1978 are examined, including airspeed, attitude, body position at ejection, type of injury, location, and reported causal factors. Attention was focused on fracture and fracture/dislocation injuries. A total of 40 aircraft containing 78 aircrew members were included in the study, which covered 50 sustained injuries. The type and extent of the trauma was found to be a function of airspeed, attitude, and initial body position. Radiographic techniques are recommended for delineating the causal factor that produced a particular injury pattern. M.S.K.

A84-10749

U-2, TR-1, SR-71 PRESSURE SUIT OPEN WATER SURVIVAL TRAINING

K. E. MAGNUSSON, T. P. PHILPOTT, and D. R. JONES (USAF, Physiological Support Div., Beale AFB, CA) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 297-307.

In-water survival training procedures for crewmembers on U-2, SR-71, and TR-1 aircraft are described. Each training session lasts 3 hr and is performed while the crewmember is wearing full life support equipment. Descent procedures are practiced in the pressure suit while suspended from a harness over the water. Three different water entry and drag sessions are performed, i.e., immediate release, back drag, and front drag. The aircrew practice freeing themselves from a parachute that has come down on top of them and, after freeing themselves, must climb aboard a liferaft. Practice is also carried out on using survival gear once in the raft, and also on preparing for a lift by sling or litter from the raft. M.S.K.

A84-10893*# Dayton Univ., Ohio.

WING CONTAMINATION - THREAT TO SAFE FLIGHT

J. K. LUERS (Dayton, University, Dayton, OH) Astronautics and Aeronautics (ISSN 0004-6213), vol. 21, Nov. 1983, p. 54-59. NASA-supported research. refs

Attention is given to the initial results of systematic investigations of the potentially hazardous effect of heavy rain, ice, and frost accretion on aircraft wings. In the laminar region of an airfoil, roughness interferes with smooth flow and tends to encourage transition from laminar to turbulent flow upstream of its normal point of occurrence. In the airfoil's turbulent region, roughness considerably worsens the turbulent friction coefficient, thereby increasing the drag coefficient. Consequent dramatic decreases of maximum lift coefficient at high angles of attack lead to premature stall. Such decreases in stall angle destroy the safety margin of an aircraft approaching stall. An assessment is given to the state of knowledge in this field of research. O.C.

A84-11043#

AN ASSESSMENT OF THE SAFETY OF HYDROGEN-FUELED AIRCRAFT

G. D. BREWER (Lockheed-California Co., Burbank, CA) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 935-939. refs

Previously cited in issue 17, p. 2684, Accession no. A82-35077

A84-11063#

THE HELICOPTER AS AN ELEMENT OF AIR TRANSPORT SYSTEMS

C. HAMSHAW-THOMAS (Westland Helicopters, Ltd., Yeovil, Somerset, England) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 15 p.

The problems confronting commercial aviation and the role of large helicopters in solving them are considered. The problems discussed include ground-transportation delays, the financial difficulties of small airports and the airlines serving them, and the traffic limitations of large hub airports. Helicopters can contribute to solving these problems if they can provide passenger accommodations comparable to those of fixed-wing aircraft, carry the electronics required for RNAV, be tough and reliable enough for scheduled service in less-than-ideal weather conditions, meet environmental standards (especially for noise levels), and achieve these goals economically. It is suggested that current large military helicopters, which can be adapted for 15-30 seat passenger use, provide an excellent starting point for this approach. T.K.

A84-11067#

A NEW CONCEPT FOR A RESCUE HELICOPTER TO MEET THE NEEDS OF EMERGENCY MEDICINE, BASED ON THE BK-117 [NEUKONZEPTION EINES RETTUNGSHUBSCHRAUBERS NACH DEN ERFORDERNISSEN DER NOTFALLMEDIZIN AM BEISPIEL DER BK 117]

E. STOLPE (Staedtisches Krankenhaus, Munich, West Germany) and CHR. BUEHLER (Schweizer Rettungswacht, Zurich, Switzerland; Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 12 p. In German.

The modification of a BK-117 multipurpose helicopter for use as an emergency-rescue ambulance vehicle is described and illustrated. The BK-117 has been equipped to transport one or two severely injured patients as well as the pilot, copilot, physician, and paramedic. Fixed equipment (including oxygen, infusion, and EKG systems) is compatible with hospital apparatus whenever possible and complemented by portable equipment sets for treatment of the patients before transport. The advantages gained by cooperative planning of the rescue configuration during early stages of the BK-117 design process are stressed. T.K.

A84-11274

THE FINE ART OF ACCEPTING AN AIRLINER

W. H. GOODMAN Exxon Air World, vol. 35, no. 2, 1983, p. 12-18.

The management practices typical of airline acceptance of new aircraft from a manufacturer are presently exemplified by Air Europe's relationship with Boeing during the assembly and predelivery inspections of a 757 airliner. The airline's representative will, over the five and one-half months from keel-laying to flyaway, search for fabrication and assembly details that do not conform to the aircraft's engineering drawings as well as for accurately executed design features which may give rise to problems during aircraft operation or maintenance. Minor design changes are in the latter case incorporated. O.C.

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A84-11615

CONVECTIVE VIOLENCE AND HUMILITY

G. M. BRUGGINK International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 133-137.

Two aircraft accidents caused by meteorological conditions are discussed to ascertain if the catastrophes occurred because of procedures that did not take full advantage of the state of the art in aircraft capabilities. Structural integrity was concluded to have failed in a 1981 crash of a Fokker F-28 as it entered the active field of a tornado. It is shown that weather radar had not properly tracked the tornado's path, which was actually on a collision path with the aircraft. The microburst wind shear that downed a 727 near New Orleans in 1982 had been foreshadowed by a pilot of a preceding aircraft that had received a 40 kn/hr airspeed boost upon takeoff. The verbal wind shear warning was not official and was therefore ignored, as happened in a similar case in New York in 1975. It is recommended that weather report capabilities and reports be upgraded through the installation of Doppler radar units at all FAA facilities and ensurance of facile transmittal of reports of difficulties by one pilot to other pilots in the area.

M.S.K.

A84-11616

ANATOMY OF A HELICOPTER ACCIDENT

R. WILLIAMS International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 139-149.

The reasons for the downing of a Bell 212 helicopter in the North Sea in July 1983 are discussed, together with recommendations for avoiding such incidents in the future. It is suggested that the aircraft generically had a defective airspeed indicator, handle somewhat poorly in light winds, and significantly increase the pilot's workload in severe weather. The flight was made in visual contact with the sea surface at 200 ft altitude and 65 kn indicated airspeed. A nose-up condition began during approach to the landing pad on an oil rig. The situation worsened as the pilot applied corrective measures while climbing into a cloud, where disorientation occurred and the crash followed minutes afterward. It is suggested that the weather reports from the rig were inaccurate, as may have been the pilot's references to the outside world and his instruments due to the direction in which he chose to turn. It is recommended that periodic instrument flight rule check-outs be given to helicopter pilots, that emergency beacons be installed on helicopters, and that high visibility paint be spread on the landing platforms. Furthermore, procedures are suggested for preventing passenger injuries during sea crashes, together with more liferafts, better seat belt release mechanisms, and survival suits.

M.S.K.

A84-11617

ACCIDENT SURVIVAL - THE AIRPORT AND THE AIRCRAFT

B. V. HEWES (Air Line Pilots Association, Washington, DC) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 151-160.

Conditions at runways which have been the cause of accidents are identified, and recommendations are presented for alleviating the dangers. Hazards are chiefly created by the shortness of runways, combined with the presence of obstacles beyond the ends of the runways, e.g., roads, embankments, lights, ditches, etc. Improved seat harnesses, in addition to restraints for cabin equipment and furnishings, and the widespread use of FM-9 fuel antimisting agent could significantly reduce the fatalities and injuries occurring on landing strips, where 80 percent of all air accidents happen. Another improvement would be transmitters to aid firefighters in finding downed aircraft in poor visibility conditions, and access roads to reach them. Hovercraft are cited as the most effective means of retrieving passengers from crashes in water around airports, when passengers are subject to hypothermic conditions.

M.S.K.

A84-11618

THE SURVIVABILITY ASPECTS OF POST CRASH FIRES

J. HORSFALL International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 161-168: refs

The processes by which flame propagates after an aircraft crash are described, together with current and available protective measures. It is noted that crashworthiness certification for commercial aircraft include assertions that passengers can escape within 90 sec, although practice has demonstrated that 4 or 5 min are required. Kerosene fuels reduce the fire hazard, as does stronger fuselage construction, which inhibits the spread of fire to the interior of an aircraft. It is recommended that fire curtains and stronger windows be installed on aircraft to aid in preventing fire entrance into the interior. Tests with a modified C-133 transport have shown that implementation of fireproof materials into seat covers can delay flashover cabin conflagrations by significant lengths of time. Further, a computer simulation has been devised for predicting the flame behavior of materials intended for installation in the interior of commercial aircraft.

M.S.K.

A84-11620

FLIGHT ATTENDANT TRAINING - HOW IT INFLUENCES THE SUCCESS OR FAILURE OF EMERGENCY EVACUATIONS

S. A. VINCENT International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 195-200.

Procedures and equipment that could aid in effectively training flight attendants in the use of emergency evacuation equipment and directing passengers to safety are described. It is recommended that the attendants train on real aircraft to learn the location and operation of apparatus such as emergency chutes, and cabin mock-ups to learn operation of escape doors and the tail cone exits. Additional training is also needed with door mock-ups which are faithful to actual aircraft doors with chutes to establish procedures to follow when automatic systems fail and manual deployment becomes necessary. Several instances of failed escape attempts are cited to demonstrate deficiencies in current evacuation training and equipment offered to flight attendants.

M.S.K.

A84-11961

AN ECONOMIC ANALYSIS OF NEW TRANSPORT TECHNOLOGY (USING EQUIPMENT IN AIR TRANSPORT AS AN EXAMPLE) [EKONOMICHESKAIA OTSENKA NOVOI TRANSPORTNOI TEKHNIKI /NA PRIMERE SREDSTV VOZDUSHNOGO TRANSPORTA/]

V. N. TOMILIN IN: Problems in the prediction and optimization of transport operation (Problemy prognozirovaniia i optimizatsii raboty transporta). Moscow, Izdatel'stvo Nauka, 1982, p. 315-327. In Russian. refs

A84-12067

FATAL GLIDING ACCIDENTS IN THE UNITED KINGDOM - 1960-1980

J. N. C. COOKE (Princess Mary's Royal Air Force Hospital, Aylesbury, Bucks., England), A. J. C. BALFOUR, and K. E. A. UNDERWOOD GROUND (RAF, Institute of Pathology and Tropical Medicine, Aylesbury, Bucks., England) (Joint Committee on Aviation Pathology, Scientific Session, 13th, Toronto, Canada, Oct. 1982) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 54, Nov. 1983, p. 1028-1030.

A84-12183#

FATAL AIRCRAFT ACCIDENTS AND THEIR CAUSES [UBER TOEDLICHE FLUGUNFAELLE UND DEREN URSACHEN]

W. GABRIEL Tuebingen, Universitaet, Medizinische Fakultae, Doktor der Medizin Dissertation, 1982, 185 p. In German. refs

The adequacy of the German transport ministry's guidelines for determining the physical qualifications of air transport personnel to guarantee the safety of aircraft pilots and passengers is evaluated using a specific accident fatality involving severe organ damage. Four cases in which the guidelines did not suffice to prevent pathological organic changes are presented. Proposals for improving the qualification tests are presented.

C.D.

A84-12351#

FLIGHT TESTING OF MILITARY RAM AIR PARACHUTES

C. JONES and A. W. WILSON (Aeroplane and Armament Experimental Establishment, Salisbury, Wilts., England) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 12 p. (AIAA PAPER 83-2787)

The introducing of ram air inflated parachutes in recent years has resulted in a considerable increase in the testing activity. The improved aerodynamic performance of ram air parachutes relative to the more conventional hemispheric types and the potentially greater deployment forces has caused us to develop new instrumentation and test techniques. Two man-mounted instrumentation packages have been developed, one to measure deployment forces and the other to measure physiological factors. An articulated dummy has also been developed for use in the initial testing of a new parachute. These systems are described and typical results are given which illustrate the different performances of the round and ram air parachutes and also show the extent to which a progressive, safe, quantitative trial can now be undertaken. Author

N84-10002# Joint Publications Research Service, Arlington, Va.
MINISTER BUGAYEV PROMISES IMPROVED AEROFLOT SERVICES

B. BUGAYEV *In its* USSR Rept.: Transportation, No. 126 (JPRS-84457) p 1-2 3 Oct 1983 Transl. into ENGLISH from Pravda (USSR), 21 May 1983 p 3
 Avail: NTIS HC A05

Plans to improve airline passenger service are discussed. Particular attention will be given to service to children, invalids, and persons requiring accelerated departure. R.J.F.

N84-10005# Joint Publications Research Service, Arlington, Va.
IMPROVED AIR SHIPMENT OF FRUIT REPORTED THIS YEAR
 P. PROTSENKO *In its* USSR Rept. Transportation, No 126 (JPRS-84457) p 9-10 3 Oct. 1983 Transl. into ENGLISH from Vozdushnyy Transport (USSR), 2 Jul. 1983 p 2
 Avail: NTIS HC A05

The shipment of fruit, especially cherries, is discussed. A bottleneck is identified at Arkhangel'sk airport. In response to complaints, shippers are told that perhaps they should not fly there. R.T.F.

N84-10034*# National Aeronautics and Space Administration.
 Ames Research Center, Moffett Field, Calif.
A SIMULATION INVESTIGATION OF THE EFFECTS OF ENGINE-AND THRUST-RESPONSE CHARACTERISTICS ON HELICOPTER HANDLING QUALITIES

L. D. CORLESS and C. L. BLANKEN (Army Aviation Research and Development Command, Moffett Field, Calif.) Oct. 1983 23 p refs Presented at the 9th European Rotorcraft Forum, Stresa, Italy, 13-15 Sep. 1983 (NASA-TM-85489, A-9469; NAS 1.15:85489; USAAVRADCOM-TR-83-A-13) Avail: NTIS HC A02/MF A01 CSDL 01C

A multi-phase program is being conducted to study, in a generic sense and through ground simulation, the effects of engine response, rotor inertia, rpm control, excess power, and vertical damping on specific maneuvers included in nap-of-the-Earth (NOE) operations. The helicopter configuration with an rpm-governed gas-turbine engine are considered. Handling-qualities-criteria data are considered in light of aspects peculiar to rotary-wing and NOE operations. The results of three moving-based piloted simulation studies are summarized and the frequency, characteristics of the helicopter thrust response which set it apart from other VTOL types are explained. Power-system response is affected by both the engine-governor response and the level of rotor inertia. However, results indicate that with unlimited power, variations in engine response can have a significant effect on pilot rating, whereas changes in rotor inertia, in general, do not. The results also show that any pilot interaction required to maintain proper control can significantly degrade handling qualities. Data for

variations in vertical damping and collective sensitivity are compared with existing handling-qualities specifications, MIL-F-83300 and AGARD 577, and show a need for higher minimums for both damping and sensitivity for the bob-up task. Results for cases of limited power are also shown. Author

N84-10035# Federal Aviation Administration, Atlantic City, N.J.
A LABORATORY TEST FOR EVALUATING THE FIRE CONTAINMENT CHARACTERISTICS OF AIRCRAFT CLASS D CARGO COMPARTMENT LINING MATERIAL Final Report, Jul. 1982 - Mar. 1983

L. J. BROWN, JR. and C. R. COLE Oct. 1983 36 p refs (DOT/FAA/CT-83/44; FAA PROJ. 181-350-400) Avail. NTIS HC A03/MF A01

The Federal Aviation Administration Standard 2-gallon/hour burner was adapted to measure the burn-through resistance of aircraft cargo compartment lining materials. This laboratory test can subject lining samples to the fire conditions found in full-scale class D cargo compartment tests. A 5-minute test period is of adequate duration to evaluate the performance of cargo lining materials, based on full-scale test results which showed that class D fire intensity is reduced to a smoldering state after several minutes. It was determined that the 2-gallon/hour burner test is superior to the vertical and 45 deg bunsen burner tests specified in Federal Air Regulations (FAR's) 25.853 and 25.855 for evaluating the flammability and burn-through resistance of cargo compartment lining materials. The following criteria for class D cargo compartment lining materials using the 2-gallon/hour burner test are proposed: Sample must prevent burn-through for 5 minutes, and peak temperatures at 4 inches above the upper surface of a horizontal test sample should not exceed 400 deg Fahrenheit. Based on results with this laboratory test, it is concluded that fiberglass lining materials provide sufficient protection to prevent burn-through in a class D cargo compartment fire, however, Nomex(tm) and Kevlar (tm) lining materials will not contain a class D cargo compartment fire. Author

N84-10036# National Transportation Safety Board, Washington, D. C. Bureau of Accident Investigation
AIRCRAFT ACCIDENT REPORT: MIDAIR COLLISION OF NORTH AMERICAN ROCKWELL AERO COMMANDER MODEL 560E, N3827C AND CESSNA 182Q, N96402, LIVINGSTON, NEW JERSEY, NOVEMBER 20, 1982

28 Jun. 1983 29 p (PB83-910403, NTSB/AAR-83/03) Avail: NTIS HC A03/MF A01 CSDL 01C

About 1614 e.s.t., on November 20, 1982, a North American Rockwell Aero Commander Model 560E, N3827 C, and a Cessna Model 182Q, N96402, collided in midair about 2,000 feet over Livingston, New Jersey, and crashed. The weather was clear at the collision altitude, and both airplanes were operating under visual flight rules. The accident occurred in the controlled airspace of the New York Terminal Control Area. Shortly before the collision, the pilot of N3827C had advised a New York Terminal Control Area. Shortly before the collision, the pilot of N3827C had advised a New York Terminal Radar Approach Control controller of his location and altitude. There was no evidence that the pilot of N96402 had radio contact with an air traffic facility. The National Transportation safety Board determines that the probable cause of this accident was the failure of the pilots to exercise adequate vigilance to detect and avoid each other. Contributing to the accident was the failure of the pilot of N96402 either to keep clear of the New York Terminal Control Area or to avail himself of the traffic advisory capability of the New York Terminal Radar Approach Control. Also contributing to the accident was the failure of the controller to observe the potential conflict and to adequately convey traffic information to N3827C. Author

03 AIR TRANSPORTATION AND SAFETY

N84-10037*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

OPTIMIZATION OF AIRCRAFT SEAT CUSHION FIRE BLOCKING LAYERS Final Report, Jul. 1981 - Jul. 1982

D. A. KOURTIDES, J. A. PARKER, A. C. LING, and W. R. HOVATTER Mar. 1983 216 p refs
(Contract DTFA03-81-A-00149)

(NASA-TM-85430; NAS 1.15:85430; AD-A130144;
DOT/FAA/CT-82/132) Avail: NTIS HC A10/MF A01 CSCL 01C

This report describes work completed by the National Aeronautics and Space Administration - for the Federal Aviation Administration Technical Center. The purpose of this work was to examine the potential of fire blocking mechanisms for aircraft seat cushions in order to provide an optimized seat configuration with adequate fire protection and minimum weight. Aluminized thermally stable fabrics were found to provide adequate fire protection when used in conjunction with urethane foams, while maintaining minimum weight and cost penalty. GRA

N84-10038# Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

CRASHWORTHINESS: AN ILLUSTRATED COMMENTARY ON OCCUPANT SURVIVAL IN GENERAL AVIATION ACCIDENTS

W. R. KIRKHAM, S. M. WICKS, and D. L. LOWREY Apr. 1983 41 p

(AD-A130198; FAA-AM-83-8) Avail: NTIS HC A03/MF A01 CSCL 01B

This report is an illustrated commentary on crash survival in general aviation aircraft. Photographs, drawings, and discussion present some basic concepts of crash forces; mechanisms of injury to occupants; and the roles of shoulder harnesses, lapbelts, and seats in attenuating crash forces. Findings in a number of accidents relate seats and restraints to the fate of the occupants. The report is designed to inform the reader of the value of good restraints in crashes of general aviation aircraft. Also it will serve to orient Federal Aviation Administration (FAA) personnel and others to a set of projection slides that may be used wholly or in part in safety presentations to pilots and aviation groups. The projection slides, duplicates of the photographs and drawings in this report, are available from the Aeromedical Education Branch of the FAA Civil Aeromedical Institute. GRA

N84-10039# General Dynamics/Fort Worth, Tex.

ADVANCED ULTRA-VIOLET (UV) AIRCRAFT FIRE DETECTION SYSTEM. VOLUME 3: GROUND SUPPORT EQUIPMENT (GSE) FOR SYSTEM CHECK-OUT Final Report, Dec. 1977 - Dec. 1981

R. J. SPRINGER, P. H. SHEATH, S. P. ROBINSON, and D. J. V. SMITH Wright-Patterson AFB, Ohio AFWAL Aug. 1982 193 p refs

(Contract F33615-77-C-2029; AF PROJ. 2348)
(AD-A130298; AFWAL-TR-82-2062-VOL-3) Avail: NTIS HC A09/MF A01 CSCL 01B

A portable unit is described for automatically checking out a system which uses ultraviolet radiation to detect aircraft fire hazards. The unit reads out stored data gathered during flight, checks the operational capability of the detector, and identifies faulty line replaceable units. Operating instructions are included along with a description of system design, the system method, the hardware, and the software. A.R.H.

N84-10040# National Bureau of Standards, Boulder, Colo. Environmental Sciences Group.

MULTI-SCALE ANALYSES OF METEOROLOGICAL CONDITIONS AFFECTING PAN AMERICAN WORLD AIRWAYS FLIGHT 759

F. CARACENA, R. A. MADDOX, J. F. W. PURDOM, J. F. WEAVER, and R. N. GREEN Jan. 1983 51 p refs

(PB83-222562; NOAA-TM-ERL-ESG-2; NOAA-83062206) Avail: NTIS HC A04/MF A01 CSCL 01B

At the time of flight 759's departure there were thunderstorms in the New Orleans area. In addition, while the plane was taxiing

to the takeoff runway, personnel in the New Orleans tower issued several wind shear advisories for winds that had activated the airport's low level windshear alert warning system. The seriousness of this particular event provided the motivation for a detailed examination of the meteorological conditions at the time of the accident. The evolution of weather events immediately before and during the crash was reconstructed so that the precise role of meteorological features could be assessed. GRA

N84-11100*# Ohio Univ., Athens. Center for Avionics Engineering

INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT OHIO UNIVERSITY, 1982

R. H. MCFARLAND In NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 3-6 Oct. 1983 refs

Avail: NTIS HC A07/MF A01 CSCL 01C

Refinement of the Loran-C receiver system for general aviation use was described. The capability to provide area navigation sometimes called random navigation (RNAV) was accomplished by providing new software. Microcomputers were used to accomplish the calculations which were performed in flight to demonstrate these devices are cost effective in the implementation of Loran-C navigational information. B.G.

N84-11104*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.

INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT MIT

R. W. SIMPSON In NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 75-80 Oct. 1983 refs

Avail: NTIS HC A07/MF A01 CSCL 01C

A summary of the research done by the Massachusetts Institute of Technology is addressed including Loran-C for guidance in flying approaches, an air traffic control simulator for the Manned Vehicle Simulation Research Facility, and an air traffic collision model theory. B.G.

N84-11108*# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.

INVESTIGATION OF AIR TRANSPORTATION TECHNOLOGY AT PRINCETON UNIVERSITY

R. F. STENGEL In NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 109-115 Oct. 1983 refs

Avail: NTIS HC A07/MF A01 CSCL 01C

The Air Transportation Technology Program at Princeton University, a program emphasizing graduate and undergraduate student research, proceeded along six avenues during the past year: investigation of fuel use characteristics of general aviation aircraft, experimentation with an ultrasonic altimeter, single pilot instrument flight, application of fiber optics in flight control systems, voice recognition inputs for navigation/communication receiver tuning, and computer aided aircraft design. Author

N84-11152*# Control Data Corp., Minneapolis, Minn.

TEMPERATURE HISTORIES OF COMMERCIAL FLIGHTS AT SEVERE CONDITIONS FROM GASP DATA Final Report

W. H. JASPERSON and G. D. NASTROM Oct. 1983 64 p refs

(Contract NAS3-21249)

(NASA-CR-168247; NAS 1.26:168247) Avail: NTIS HC A04/MF A01 CSCL 01C

The thermal environment of commercial aircraft from a data set gathered during the Global Atmospheric Sampling Program (GASP) is studied. The data set covers a four-year period of measurements. The report presents plots of airplane location and speed and atmospheric temperature as functions of elapsed time for 35 extreme-condition flights, selected by minimum values of several temperature parameters. One of these parameters, the severity factor, is an approximation of the in-flight wing-tank temperature. Representative low-severity-factor flight histories may

be useful for actual temperature-profile inputs to design and research studies. Comparison of the GASP atmospheric temperatures to interpolated temperatures from National Meteorological Center and Global Weather Central analysis fields shows that the analysis temperatures are slightly biased toward warmer than actual temperatures, particularly over oceans and at extreme conditions. Author

N84-11153# Boeing Military Airplane Development, Seattle, Wash.

PROPOSED REVISIONS TO MIL-F-8785C RELATED TO FLIGHT SAFETY OF AUGMENTED AIRCRAFT. VOLUME 1. SECTION 1 - 7 Final Report, May 1978 - Aug. 1980

J. M. SCHULER and M. A. DAHL Wright-Patterson AFB, Ohio AFWAL Apr 1982 232 p refs 3 Vol.
(Contract F33615-78-C-3603; AF PROJ 2403)
(AD-A131414; AFWAL-TR-82-3014-VOL-1) Avail NTIS HC A11/MF A01 CSCL 01B

New tentative criteria have been developed for airplanes with relaxed static longitudinal stability based on approach and landing ground simulation, but augmented by the available flight test data. It is shown that a criterion based on just time-to-double amplitude is invalid, and other elements in the pitch attitude transfer function must be included. Criteria based on both closed-loop frequency response and airplane parameters (open-loop) are developed. This report covers the results obtained in one of a series of Air Force programs to update MIL-F-8785, Flying Qualities of Piloted Airplanes. Author (GRA)

N84-11154# Boeing Military Airplane Development, Seattle, Wash.

PROPOSED REVISIONS TO MIL-F-8785C RELATED TO FLIGHT SAFETY OF AUGMENTED AIRCRAFT. VOLUME 2. APPENDICES A - F Final Report, May 1978 - Aug. 1980

J. A. SCHULER and M. A. DAHL Wright-Patterson AFB, Ohio AFWAL Apr. 1982 409 p refs 3 Vol.
(Contract F33615-78-C-3603; AF PROJ. 2403)
(AD-A131415; AFWAL-TR-82-3014-VOL-2) Avail NTIS HC A18/MF A01 CSCL 01B

New tentative criteria have been developed for airplanes with relaxed static longitudinal stability based on approach and landing ground simulation, but augmented by the available flight test data. It is shown that a criterion based on just time-to-double amplitude is invalid, and other elements in the pitch attitude transfer function must be included. Criteria based on both closed-loop frequency response and airplane parameters (open-loop) are developed. This report covers the results obtained in one of a series of Air Force programs to update MIL-F-8785, Flying Qualities of Piloted Airplanes. GRA

N84-11155# Boeing Military Airplane Development, Seattle, Wash.

PROPOSED REVISIONS TO MIL-F-8785C RELATED TO FLIGHT SAFETY OF AUGMENTED AIRCRAFT. VOLUME 3. APPENDIX G. PILOT COMMENTS Final Report, May 1978 - Aug. 1980

J. M. SCHULER and M. A. DAHL Wright-Patterson AFB, Ohio AFWAL Apr. 1982 123 p refs 3 Vol.
(Contract F33615-78-C-3603; AF PROJ. 2403)
(AD-A131416; AFWAL-TR-82-3014-VOL-3) Avail. NTIS HC A06/MF A01 CSCL 01B

New tentative criteria have been developed for airplanes with relaxed static longitudinal stability based on approach and landing ground simulation, but augmented by the available flight test data. It is shown that a criterion based on just time-to-double amplitude is invalid, and other elements in the pitch attitude transfer function must be included. Criteria based on both closed-loop frequency response and airplane parameters (open-loop) are developed. This report covers the results obtained in one of a series of Air Force programs to update MIL-F-8785, Flying Qualities of Piloted Airplanes. GRA

04

AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

A84-10518

NEW CENTROID ALGORITHM BASED UPON AMPLITUDE-ANGLE SIGNATURE

R. J. MACHUZAK, E. R. GRAF, S. A. STARKS, and C. L. PHILLIPS (Auburn University, Auburn, AL) IEEE Transactions on Aerospace and Electronic Systems (ISSN 0018-9251), vol. AES-19, July 1983, p. 568-576. refs
(Contract N00039-80-C-0032)

A method of estimating the centroid location of a target utilizing radar scan return amplitude versus angle information is presented. The method is compared with three thresholding estimators and a first moment estimator in a computer-simulated automatic landing system. This new method is the most robust and accurate during periods of low signal-to-noise ratio. In periods of high signal-to-noise ratio the method has less error than the thresholding methods and is similar in accuracy to the first moment estimator. Furthermore, the number of pulse transmissions required to obtain a desired level of performance in noise is much less than that needed for the thresholding methods and the first moment estimator employed in this simulation. Author

A84-10524

PROBABILITY OF PULSE COINCIDENCE IN A MULTIPLE RADAR ENVIRONMENT

G. T. DEMOS and M. S. WEPRIN (Northrop Corp., Defense Systems Div., Rolling Meadows, IL) IEEE Transactions on Aerospace and Electronic Systems (ISSN 0018-9251), vol. AES-19, July 1983, p. 635-640

Elementary probability theory is used to develop three formulas for the probability of two or more pulses being coincident at an observer's aircraft position in a multiple radar environment. The first formula is for nonscanning tracking type radars with different pulsewidths (PWs) and pulse repetition frequencies (PRFs), the second is for generically identical nonscanning radars with similar PWs and PRFs, and the third is for scanning type radars such as air search radars with similar PWs and PRFs. The probability of coincidence is related to the mean-time-between-coincidences (MTBC) and to the average coincidence rate. Two sample problems are given. Author

A84-10525

THE DEVELOPMENT OF AUTOMATIC ALTITUDE REPORTING FOR AIR TRAFFIC CONTROL

J. W. KLOTZ IEEE Transactions on Aerospace and Electronic Systems (ISSN 0018-9251), vol. AES-19, July 1983, p. 650-656 refs

A84-10568#

PRECISION TIMING IN COMMERCIAL FLIGHT - A WAY TO INCREASE EFFICIENCY THROUGH ONBOARD AND GROUND-BASED AIDS [ZITGENAUES FLIEGEN VON VERKEHRSFLUGZEUGEN - EIN WEG ZUR LEISTUNGSSTEIGERUNG UEBER BORD- UND BODENSEITIGE HILFEN]

R. ONKEN, V. ADAM, and W. LECHNER (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov 11, 12, 1982. 18 p. In German. refs
(DGLR PAPER 82-095)

The development and testing of computer-orientated metering-planning and approach-sequencing (COMPAS) system is reported. COMPAS is based on a 4D model of aircraft control in the interval between its entrance into the terminal maneuvering

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area (TMA) and its arrival at the metering fix point (where approach control by conventional ATC takes over). The horizontal path of the aircraft is set and adjusted to allow it to arrive at the metering fix on a fuel-conserving gradual glide descent path at a precisely preset time, the commands are relayed to the pilot for manual execution or directly to advanced autopilot devices. Flight tests reveal both the importance of accurate wind measurements and wind modeling and the good performance of the prototype system. The error at the metering fix was less than \pm or - 5 sec. T.K.

A84-10755 DESIGN AND PERFORMANCE CONSIDERATIONS IN MODERN PHASED ARRAY RADAR

E. R. BILLAM (Admiralty Surface Weapons Establishment, Portsmouth, Hants., England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982 . London, Institution of Electrical Engineers, 1982, p. 15-19.

Although phased array radars with a fully steerable pencil beam have been in existence since the 1950's, their impact on the air defense and air traffic control field has been slight. This development occurred because conventional fixed rotation rate radars were cheaper and able to satisfy the requirements. However, the situation may change as a consequence of increasingly stringent performance requirements for radar and the advances of modern technology. The present investigation is concerned with some of the new developments, taking into account their application to the design of a long range air defense radar. Aspects of frame time optimization are discussed, giving attention to the cumulative probability of detection, the surveillance frame time, and the effect of tracking load. The choice of the frequency band is considered along with waveforms. G.R.

A84-10759 A BRITISH AEW RADAR SYSTEM

J. CLARKE (Royal Signals and Radar Establishment, Malvern, Worcs., England) and J. KING (Marconi Avionics, Ltd., Rochester, Kent, England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982 . London, Institution of Electrical Engineers, 1982, p. 41-45.

The introduction into service of the Nimrod AEW MK 3 will fulfill the British requirement for a new Airborne Early Warning (AEW) aircraft. With the implementation of medium pulse repetition frequency pulse-Doppler and modern digital techniques in the air surveillance role, the AEW Nimrod will detect high and low altitude aircraft independent of the clutter environment. Attention is given to the design rationale, the transmission system, the antenna system, the reception system, Doppler signal processing, the pulse mode, and aspects of data handling and display. The AEW Mission System Avionics (MSA) will provide airborne surveillance, detection, tracking, and recognition of airborne and maritime targets, and will link into the NATO Air Defense Environment, particularly the UK segment. G.R.

A84-10760 SACRIFICES IN RADAR CLUTTER SUPPRESSION DUE TO COMPROMISES IN IMPLEMENTATION OF DIGITAL DOPPLER FILTERS

J. W. TAYLOR, JR. (Westinghouse Defense and Electronic Systems Center, Baltimore, MD) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982 . London, Institution of Electrical Engineers, 1982, p. 46-50. refs

In most modern radars, digital Doppler filtering is employed to discriminate between desired echoes from aircraft and undesired clutter echoes from terrain, sea, rain, and chaff. Nonrecursive or finite impulse response (FIR) filters are mainly utilized. However, in order to reduce hardware costs, the potential performance of such filters is often sacrificed. The present investigation is concerned with the impact of three common compromises. Attention is given to fundamental concepts, performance objectives, multiple filter bank examples, and single filter (MTI) examples. The compromises selected to reduce hardware cost include the FFT algorithm, a small number of bits of weighting coefficients,

and the omission of automatic compensation for gain and phase imbalance in in-phase and quadrature data. G.R.

A84-10762 RELIABLE SINGLE SCAN TARGET ACQUISITION USING MULTIPLE CORRELATED OBSERVATIONS

R. A. DANA (Mission Research Corp., Santa Barbara, CA) and D. MORAITIS (Hughes Aircraft Co., Fullerton, CA) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982 . London, Institution of Electrical Engineers, 1982, p. 61-65.

The flexibility provided by modern radar makes possible a reliable target acquisition on a single scan. An acquisition algorithm is discussed along with the probability of n detections on n dwells during a scan, taking into account the constant cross section during a scan, the independent cross section from dwell-to-dwell, and the Rayleigh target with cross section decorrelation. The probability of acquisition is investigated, giving attention to the effects of lower thresholds, the effects of increased signal-to-noise ratio, and the effects of cross section decorrelation. G.R.

A84-10772 A FIXED-BEAM MULTILATERATION RADAR SYSTEM FOR WEAPON IMPACT SCORING

S. GASKELL (RCA, Government Systems Div., Cherry Hill, NJ) and M. FINCH (Ministry of Defence, London, England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982 . London, Institution of Electrical Engineers, 1982, p. 130-133.

A radar scoring system is proposed that determines the impact point by direct measurement and extrapolation of the bomb trajectory. By using radar, scoring can be achieved in any operational weather conditions, day or night. The system comprises two independent 2D monopulse radars, each having a different transmit frequency in the same range. Each radar obtains a sequence of range and angle measurements on the bomb as it falls through the beam and takes range measurements on the target; the digitized data from the two radars is transmitted to the central computer. The estimated ranges, the range rates, and the altitude rate are combined with the known beam height and radar locations to give an estimate of the state vector (position and velocity) of the bomb at beam center. The impact point relative to the target is obtained by trajectory extrapolation. The result is shown on an alpha-numeric display and relayed orally to the pilot. V.L.

A84-10773 INSTRUMENTATION AND ANALYSIS OF AIRBORNE PULSE-DOPPLER RADAR TRIALS

J. CLARKE, E. B. COWLEY, I. W. SCROOP (Royal Signals and Radar Establishment, Malvern, Worcs., England), K. CLIFTON, and J. KING (Marconi Avionics, Ltd., Rochester, Kent, England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982 . London, Institution of Electrical Engineers, 1982, p. 134-137.

An account is given of a modern radar instrumentation package, along with a description of associated analysis tools that have been prepared and proven. The class of airborne pulse-Doppler radars of interest here comprises scanning surveillance coherent radars that use a fairly high duty ratio transmitter. It is noted that these radars are often, but not necessarily, ambiguous in range and undertake a spectral analysis of each range cell. The dwell time on target will involve one or more periods of coherent signal processing. The system described here records data at the output of the FFT at full radar resolution and also at the output of the plot extraction circuits. To do this, binary data must be recorded at a rate of at least 40 M bits per second. C.R.

A84-10776**OPTIMISING THE INTEGRATION APERTURE FOR A HIGH PRF CW SURVEILLANCE RADAR**

R. A. HALL (Marconi Avionics, Ltd., Rochester, Kent, England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 149-153. Research supported by the Ministry of Defence (Procurement Executive).

The integration of CW returns in the Doppler frequency domain is investigated for a high pulse repetition frequency CW surveillance radar. Directly included in the analysis are the effects of time dependent losses such as the Swerling I fading model, Hanning amplitude weighting, eclipsing in the time domain from the high pulse repetition frequency, and beamshape as modelled from a typical experimental pattern. The optimum window for a particular set of parameters over which to integrate is determined by quantifying detection performance against the mean signal-to-noise ratio. The mathematics enabling performance evaluation under different conditions are presented. It is demonstrated that the beamshape and Hanning weighting function, which effectively modulate the integration, reduce to a single scaling factor which modifies the S/N directly. This factor is shown to greatly simplify the inclusion of these modulations within performance calculations. NB.

A84-10781**ACTIVE ARRAY RECEIVER STUDIES FOR BISTATIC/MULTISTATIC RADAR**

J. G. SCHOENENBERGER (Racal-Decca Navigator, Ltd., New Malden, Surrey, England), J. R. FORREST (University College, London, England), and C. PELL (Royal Signals and Radar Establishment, Malvern, Worcs., England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 174-178. refs

The results of an ongoing research program aimed at developing an active receive array for bistatic/multistatic radar systems are discussed, with emphasis placed on beamforming, control, and pattern optimization. The design and operation of a beamforming network inexpensively implemented using an eight-element array and eight-bit analog-to-digital converters are described. Initial tests indicate that the desired gain and phase matching (0.2 dB and 1 deg, respectively) for the individual array element channels can be achieved. It is noted that the extension of digital beamforming technology to a larger system is dependent on the future availability and maturity of VLSI signal processing devices, but more efficient structures and algorithms are also likely to be needed. V.L.

A84-10783**MULTISTATIC TRACKING AND COMPARISON WITH NETTED MONOSTATIC SYSTEMS**

A. FARINA (Selenia S.p.A., Rome, Italy) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 183-187.

The tracking function of multistatic radar systems is analyzed, and a general architecture for data processing is proposed. Data compression and measurement selection methods are discussed which improve the performance of tracking filters. A tracking performance analysis based on a computer simulation is carried out for a two-dimensional multistatic system with one transmitter and two receivers. A comparison between multistatic tracking systems and netted monostatic systems shows that both types of system provide similar tracking accuracy. V.L.

A84-10784**MONOPULSE SECONDARY SURVEILLANCE RADAR - PRINCIPLES AND PERFORMANCE OF A NEW GENERATION SSR SYSTEM**

M. C. STEVENS (Cossor Electronics, Ltd., Harlow, Essex, England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 208-214. Research supported by the Civil Aviation Authority of England.

A figure is included showing the three radiation patterns typical of a monopulse secondary surveillance radar (SSR) antenna. It is noted that the highly directional 'interrogate' or 'sum' pattern is the principal beam used on both the transmit and receive paths. The monopulse technique can be used over the full beamwidth over which replies are received. For a typical SSR antenna, this beamwidth is approximately 4.5 deg wide, which is about twice the 3 dB beamwidth. As the antenna rotates, replies are received from each aircraft. All the replies are then associated to form a target report. A table is included summarizing the aircraft detection probability for monopulse SSR and current SSR. C.R.

A84-10785**DECODING-DEGARBLING IN MONOPULSE SECONDARY SURVEILLANCE RADAR**

G. MARCHETTI and L. VERRAZZANI (Pisa, Università, Pisa, Italy) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 215-219. refs

Criteria for detecting code garbling in secondary surveillance radar (SSR) systems are discussed, together with a confidence attribution strategy for avoiding false alarms. A necessity of assigning high-confidence bits to SSR decoded replies is noted. Decoding-degarbling is based on monopulse correlation tests in association with sufficient allowance in the uplink and downlink power budgets, a factor which gains significance when confronted with adverse flight altitudes. Incorrect high confidence bit assignment can then occur, and be ameliorated only by repeated scans and/or initiation of a new track in the scan. Azimuth resolution capability, a feature of a monopulse receiver, can yield a high-confidence signal under specified conditions, and can be confirmed by correlation tests for replies with an SNR higher than the confidence level. The strategy described is concluded suitable for implementation on operational monopulse SSR systems. M.S.K.

A84-10786**EVALUATION OF ANGULAR DISCRIMINATION OF MONOPULSE SSR REPLIES IN GARBLE CONDITION**

G. BENELLI, M. FOSSI (Firenze, Università, Firenze, Italy), and S. CHIRICI (Whitehead Motofides, Leghorn, Italy) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 220-224. Research supported by Selenia S.p.A.

The characteristics and performance of a secondary surveillance radar (SSR) monopulse receiver functioning along with DABS ATC protocols are discussed. Attention is limited to the reply-time processor (RTP) and dwell-time processor (DTP) subsystems and the occurrence of garble, i.e., the superposition of two signals from two aircraft. A computer simulation is reported for the garble condition, arising during the use of one antenna for the scans. The relative power of the two signals, the azimuth separation, and the SNR are the critical factors influencing the probability of detecting and identifying the two aircraft. The simulation covers a dummy antenna with a Gaussian curve sum pattern and a real antenna used in ATC towers. It is found that the second aircraft can be separately identified if its signal power is less than 10 dB. The DABS subsystem has the capabilities of making the distinction. M.S.K.

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A84-10787

INTEGRAL SSR ANTENNA HAVING INDEPENDENTLY OPTIMIZED SUM AND DIFFERENCE BEAMS

P. T. MUTO (Ministry of Transport, Electronic Navigation Research Institute, Tokyo, Japan), T. IZUTANI, S. ITOH, H. YOKOYAMA, and H. TAKANO (Nippon Electric Co., Ltd., Radio Application Div., Tokyo, Japan) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 225-229.

An integral secondary surveillance radar (SSR) for air route surveillance has been developed which possesses independently optimized sum and difference patterns in the azimuth plane. The SSR's primary feed is composed of six array elements, including a pair of three-azimuth elements above and below the low beam horn of the dual beam air route surveillance feed. Among the performance characteristics noted are excellent low-angle sharp cutoff in elevation, a plateau-shaped pattern at high elevation angles, and sum and difference azimuth pattern sidelobes lower than -24 dB. O.C.

A84-10788

SECONDARY RADAR PERFORMANCE PREDICTION

B. E. WILLIS (Ministry of Defence, London, England), B. PUGH, and S. STRONG (British Aerospace PLC, Dynamics Group, Bristol, England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 230-234.

It is pointed out that secondary radar is performing an increasingly important role in air traffic control and identification. The present investigation is concerned with a method which was developed to predict the performance of secondary radar. Causes of performance degradation are related to garbling, fruit, overinterrogation, and inadequate RF power margins. The considered work concentrates on the estimation of link margins and their effects on performance. The development of the method is discussed, taking into account basic considerations, the aircraft antenna gain, measurements, rigorous mathematical modelling, and simplified mathematical modelling. Programs have been developed for evaluation of link budgets on a small desk-top computer. G.R.

A84-10789

GENERIC TRACKING RADAR SIMULATOR

W. K. MCRTICHELIE, P. I. PULSIFER, and G. A. WARDLE (Defense Research Establishment, Ottawa, Canada) IN: Radar-82, Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 235-239.

A description is provided of the development and operational capabilities of a generic tracking radar simulator (TRS). The TRS is part of the Radar/Countermeasures Simulation Facility. The facility makes use of advanced technology to simulate the generic characteristics of many different fire control and missile seeker type tracking radar systems. Attention is given to the receiver subsystem, the antenna controller, aspects of digital signal processing, missile guidance and autopilot, and performance and capabilities. In conjunction with the countermeasures simulation facility, the radar simulator is a valuable tool in assessing both countermeasures and counter-countermeasures effectiveness. G.R.

A84-10791

RADAR ELECTROMAGNETIC ENVIRONMENT SIMULATION

J. F. MICHAELS (Republic Electronics, Inc., Melville, NY) IN: Radar-82, Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 245-249. refs

The present investigation is concerned with the factors which have to be considered when a simulator for radar systems is provided. A radar electromagnetic environment model is discussed, taking into account the radar cross section, scintillation noise and other noise components, aspects of target dynamics path loss factors, extended targets, and ECM considerations. Attention is

given to a delivered simulator (REES-201), and a radar net environment simulator. The first simulator provides a real time coordinated and coherent electromagnetic environment at RF about a 3D 'S' band radar, a 2D 'L' band radar, and their associated IFF equipment. The second simulator can supply the same environment while interfacing with many radars. G.R.

A84-10793

THE AUTOMATIC TRACK WHILE SCAN SYSTEM USED WITHIN THE SEARCHWATER AIRBORNE MARITIME SURVEILLANCE RADAR

M. SYMONS (Thorn EMI Electronics, Ltd., England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 254-258. Research supported by the Ministry of Defence (Procurement Executive). refs

The Searchwater Radar System represents an airborne surveillance radar which is employed for the detection, classification, and tracking of both small and large vessels on the surface of the sea. The main facilities are related to a Plan Position Indicator (PPI) display, a choice of A scope or B scope high resolution displays, the display of target file alphanumeric data, and an automatic track while scan facility. The present investigation is mainly concerned with the latter facility which can be employed for a multiplicity of targets. Attention is given to the basic blocks of the system, the tracking problem, the tracker gate, the alpha-beta tracker algorithm, the two channels and the breakpoint tests, the lost track, and the prediction process. G.R.

A84-10798

THE IMPACT OF WAVEFORM BANDWIDTH UPON TACTICAL RADAR DESIGN

C. H. GAGER (Mitre Corp., Bedford, MA) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 278-282. refs
(Contract F19628-82-C-0001)

High-speed integrated circuit digital processing and microwave components now make possible the design of practical tactical radars that use wide bandwidth transmitted waveforms. These waveforms are of two types. The first comprises wideband signals, where each transmitted pulse has an instantaneous bandwidth that covers the radar's full operating frequency band; the second comprises frequency-agile signals, in which each narrow bandwidth transmitted pulse may have a different center frequency within a wide operating bandwidth. The advantages and disadvantages for tactical radar of waveforms with wide instantaneous bandwidth, frequency agility, and conventional bandwidth are compared. Attention is given to the unique capabilities of the wideband and frequency-agile waveforms. The performance comparisons emphasize the resistance of each waveform to signal intercept and jamming during electronic warfare. C.R.

A84-10802

THE MULTIRADAR TRACKING IN THE ATC-SYSTEM OF THE ROME FIR

G. BARALE, G. FRASCHETTI, and S. PARDINI (Selenia S.p.A., Rome, Italy) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 296-300.

The multiradar tracking (MRT) integrates five radar systems sited in the western side part of the country. Their locations are at Rome, East Sardinia, Leghorn, Naples, and north Sicily. Each site has a primary radar, a secondary radar, a combiner, a formatting device, and a modem for the transmission of the plots to a common center. For straight-line motion, the MRT tracking performance is similar to that obtained with monoradars. The error in the estimated position is thus comparable to the radar measurement error and the error in the velocity vector estimation is from 5 to 10 knots for the speed and from 2 to 6 deg for the heading. For accelerated path, the MRT performs better than a monoradar. A figure is included showing the maximum error in the forecast position for

accelerated path as a function of the distance from the radar.

C.R.

A84-10803

METHODS FOR RADAR DATA EXTRACTION AND FILTERING IN A FULLY AUTOMATIC ATC RADAR STATION

E. GIACCARI (Selenia S.p.A., Rome, Italy) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 301-305.

A method is proposed for obtaining the maximum transfer and treatment of information with a minimum impact on hardware. This approach is facilitated by the choice of parallel microprocessors, which extend the concept of distributed intelligence to radar data acquisition and evaluation. Preliminary results obtained from a practical implementation of the method proposed here are presented. The architecture of the radar station comprises a sensor able to probe the environment and select the proper processing section for a strict control of false alarms. The filtering capabilities of this sensor comprise three types. The first is related to quasi-stationary interfering phenomena and consists in maps (periodically updated) whose boundaries define the areas where attenuation of the received signal and Doppler filtering are applied. The second works in real time for control of fast varying interference. The third type operates on a scan-to-scan basis and maintains the final alarm probability within limits acceptable by the processing devices.

C.R.

A84-10804

PRESENTATION AND PROCESSING OF RADAR VIDEO MAP INFORMATION

R. J. G. EDWARDS (Ministry of Transport, Civil Aviation Div., Wellington, New Zealand) IN: Radar-82, Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 306-310.

A radar digital video map generator (RDVM) incorporated into the intertrace section allows vector drawn maps and also alphanumeric text to be written on the radar display. This map generator is to form part of the Radar Display Support Systems (RDSS) being designed by New Zealand's Civil Aviation Division. The RDSS comprises a maintrace section, which distributes the radar signals to the displays, and an intertrace section, which generates the video maps and provides interactive keyboard/tracker-ball facilities.

C.R.

A84-10805

ASMI-18X AN AIRPORT SURFACE SURVEILLANCE RADAR

J. D. HOLCROFT and S. J. MARTIN (Racal MESL Radar, Ltd., England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 311-315. Research supported by the Department of Industry.

The X-band is selected as the optimum compromise between improving rainfall performance and increasing the antenna size. In this band, a fan beam elevation pattern can be employed in combination with RF swept gain to obtain the overall sensitivity required. This approach simplifies the antenna structure and, as a consequence of the reduced vertical aperture, results in an antenna design with very low mass and wind drag. This is an extremely important factor when the total cost of an installation is considered. Another advantage conferred by the lower operating frequency is reduced waveguide losses. Typically, a control tower roof will result in a waveguide run of 15 m. If a remote tower is used, it is desirable, particularly where extremes of climate prevail, to mount the transceivers at ground level, requiring a waveguide run of 30 m or more.

C.R.

A84-10806

DETECTION OF HAZARDOUS METEOROLOGICAL AND CLEAR-AIR PHENOMENA WITH AN AIR TRAFFIC CONTROL RADAR

D. L. OFFI, W. LEWIS, and T. LEE (FAA, Technical Center, Atlantic City, NJ) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 316-320. refs

An account is given of the modifications made in the Airport Surveillance Radar (ASR-8) test bed at the FAA Technical Center at Atlantic City Airport (N.J.). The modifications, arrived at by the FAA, the Wave Propagation Laboratory, and MIT's Lincoln Laboratory, were made in order to observe low-level wind shear and turbulence associated with both thunderstorms and aircraft trailing wake-vortices. The modifications, consisting of a second antenna system and a separate receiver and Doppler processing chain, used the standby channel of the radar for these measurements. The results obtained are summarized. In describing the system, it is noted that the 15-foot parabolic antenna is interconnected with the ASR-8, operating with a peak transmitter power of 1 MW, a frequency of 2.79 GHz, a pulse repetition rate of 1030/sec, and a pulse length of 0.6 microsec. The separate receiver and Doppler processing chain comprises inphase and quadrature detectors, analog/digital converters, and a minicomputer with associated peripherals.

C.R.

A84-10812

A KALMAN APPROACH TO IMPROVE ANGULAR RESOLUTION IN SEARCH RADARS

E. DALLE MESE, D. DE FINA (Pisa, Università, Pisa, Italy), and V. SACCO (Segnalamento Marittimo ed Aereo S.p.A., Florence, Italy) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 346-350. Research supported by the Consiglio Nazionale delle Ricerche. refs

A spatial compressor obtained by means of a Kalman approach is analyzed in order to improve search radar angular resolution. The results obtained are satisfactory by comparison to the input sequence, which offered no possibilities for distinguishing between two or more targets within the -3 dB antenna mainlobe. The performance of the compressor rapidly decreases with SNR decrease. Some improvement is obtainable by means of smoothing techniques. For good target separation, filter output thresholding should be conducted over samples within the antenna mainlobe.

O.C.

A84-10819

LAND CLUTTER STUDY - LOW GRAZING ANGLES (BACKSCATTERING)

J. W. HENN, D. H. PICTOR (British Aerospace PLC, Dynamics Group, Stevenage, Herts., England), and A. WEBB (Royal Signals and Radar Establishment, Malvern, Worcs., England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 380-384. Research supported by the Ministry of Defence. refs

In order to obtain the maximum probability of detecting low-flying weapons having low radar cross sections by means of a ground-based radar, the signal processing associated with any radar system must be designed to give a large clutter rejection factor, and the radar must be positioned to give the best possible performance. To achieve these objectives, a knowledge of clutter characteristics is essential, and since the particular threat under consideration is low-flying, the clutter characteristics near grazing incidence are of especial importance. The normalized cross section per unit area is often used to describe clutter returns. The use of this parameter implies that the returns received are caused by a large number of scattering mechanisms distributed uniformly throughout the physical area illuminated by the radar. It is noted that the effects of nonuniformities become more pronounced as the grazing angle is decreased and the cell to cell variation in the observed radar cross section increases. The results presented here concentrate on the normalized cross section per unit area.

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Studies carried out by various investigators on low-grazing-angle clutter are summarized. C.R.

A84-10822

AN X-BAND MICROSTRIP PHASED-ARRAY ANTENNA WITH ELECTRONIC POLARIZATION CONTROL

C. H. HAMILTON (Telefunken AG, Frankfurt am Main, West Germany) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 394-398.

An X-band planar microstrip antenna using electronic polarization control allows a single-axis, polarization-agile phased array to be realized, at an acceptable cost, in airborne applications. The use of microstrip radiators, pluggable triplate feeds, and series waveguide feeds, affords a compact, lightweight structure. Sidelobe performance may be improved through optimization of the phase shifter design to reduce incidental amplitude modulation. Cost may be reduced, in exchange for higher insertion loss, through the use of printed triplate phase shifters integrated into the EL feeds. O.C.

A84-10826

CABLE RADAR FOR INTRUDER DETECTION

A. C. C. WONG and P. K. BLAIR (Standard Telecommunications Laboratories, Ltd., Harlow, Essex, England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 424-428.

In recent years, the use of radiating cables as sensors in cable radar systems for intruder detection has been considered. The present investigation is concerned with an experimental intruder detection system which has been built to demonstrate the feasibility of the concept, taking into account the possibility for carrying out realistic field trials. The operation of the system is based on the pulse-Doppler radar principle. In the considered system, the pulses are guided along the length of the radiating cable instead of propagating in free space as in a conventional radar. Two cables, which are laid out in parallel, form the key components of the system. An intruder who is within the zone of influence set up by the two cables will cause a disturbance that can be detected. On the basis of the conducted experiments, it is concluded that a design of the considered type has a high potential for use in advanced perimeter protection systems. G.R.

A84-10829

AN X-BAND ARRAY SIGNAL PROCESSING RADAR FOR TRACKING TARGETS AT LOW ELEVATION ANGLES

A. PEARSON, P. BARTON, W. D. WADDUP (Standard Telecommunications Laboratories, Ltd., Harlow, Essex, England), and R. J. SHERWELL (Admiralty Surface Weapons Establishment, Portsmouth, Hants., England) IN: Radar-82, Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 439-443. Research supported by the Ministry of Defence (Procurement Executive).

The use of spatial filtering has been proposed as a method of reducing errors during radar tracking of low flying targets. The results of a comprehensive series of trials involving typical targets flying under realistic conditions are reported here which indicate that the spatial filtering technique substantially reduces elevation measurement errors resulting from multipath interference. The hardware required to implement the technique is straightforward and has proved reliable in service. The filter algorithm employed in the tests has proved to be quite robust and not excessively critical with respect to the phase and amplitude balance of the receiver channels. V.L.

A84-10830

TRACKING RADAR ELECTRONIC COUNTER-COUNTERMEASURES AGAINST INVERSE GAIN JAMMERS

S. L. JOHNSTON IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 444-447. refs

A number of techniques for defeating the inverse gain jammer against tracking radars are described. These techniques can be classified into four groups: 'natural' lobe on receive only; true lobe on receive (LORO)/conical scan on receive only (COSRO); variable conical scan frequency; and hybrid monopulse-conical scan systems. For each class, a number of interesting methods of implementation are discussed. C.D.

A84-10831

MEASURING TARGET POSITION WITH A PHASED-ARRAY RADAR SYSTEM

G. A. VAN DER SPEK (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Fysisch Laboratorium TNO, The Hague, Netherlands) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 458-463.

A series of target position measurements have been carried out in order to evaluate the performance of an experimental phased-array radar system provided with a monopulse facility. It is shown that, with the phased-array antenna used, a single target echo from within the half-power beam contour is sufficient to produce an accurate position estimate (a few percent of the beamwidth/range cell). Although a single monopulse algorithm may be adequate, the monopulse performance can be enhanced by using a set of monopulse relations in order to cope with differences related to the direction coordinate, radar frequency, and scan direction. V.L.

A84-10832

AUTOMATIC DETECTORS FOR FREQUENCY-AGILE RADAR

G. V. TRUNK and P. K. HUGHES, II (U.S. Navy, Naval Research Laboratory, Washington, DC) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 464-468.

The detection performance of various detectors for a radar employing frequency agility in the presence of broadband sidelobe jamming is studied. It is determined that, when pulse-to-pulse frequency agility is employed, the received sidelobe jamming power can vary as much as 20 dB. The best detector for this situation is found to be the ratio detector, which normalizes the received power on every pulse using the neighboring reference cells and then sums these normalized power ratios. It is suggested that, in the presence of short-pulse interference, a ratio detector using limiting or an interference detector should be utilized. N.B.

A84-10833

A NOVEL 35 GHZ 3-D RADAR FOR FLIGHT ASSISTANCE

G. M. RITTER (Siemens AG, Munich, West Germany) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 469-472.

The capabilities of a novel 35-GHz 3D radar for flight assistance are discussed, with reference made to results of flight tests. One application of this radar system is the generation of 3D images of the terrain to assist the pilot of a helicopter or an aircraft in low-level missions. The system employs fan-beam antennas having high resolution in azimuth only. The missing resolution in elevation is achieved by interferometer and doppler processing. This approach helps avoid the problems associated with flat antennas having good resolution in both azimuth and elevation which would be normally required to form a 3D image. V.L.

A84-10837

GROUND CLUTTER SUPPRESSION USING A COHERENT CLUTTER MAP

J. S. BIRD (Department of Communications, Ottawa, Canada) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 491-495. refs

The key to the utility of coherent clutter map lies in the nature of the clutter returns. To establish the long term coherence of ground clutter as seen by a step-scan phased array radar, returns from an isolated island have been examined. For each range bin, the maximum and minimum values for the real and imaginary channel are plotted. Attention is then given to the concept of a coherent clutter map processor whose performance depends on how well the clutter estimator can track clutter. In order to compare the performance of the coherent clutter map to that of variable threshold techniques, an expression for the coherent clutter map system is derived. It is shown that long term coherence permits the use of a coherent clutter map which significantly outperforms traditional methods for handling such clutter. O.C.

A84-10839

THE USE OF A MULTI-LEVEL QUANTISER IN PLOT EXTRACTION

P. N. G. KNOWLES (Plessey Electronic Systems Research, Ltd., Havant and Waterloo, Hants., England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 501-504. Research supported by the Ministry of Defence (Procurement Executive). refs

The use of a multilevel quantiser offers substantial plot extractor performance improvements in the presence of the clutter often experienced by surveillance radars, due to the quantiser's ability to defer threshold decisions until the region surrounding the cell of interest is available for examination. The azimuth correlation estimator is found to be especially effective in reducing clutter plots without losing target detectability under clear conditions. In addition, the beam shape cross-correlator used yields a substantial improvement in azimuth resolution. O.C.

A84-10841

MODULAR SURVIVABLE RADAR FOR BATTLEFIELD SURVEILLANCE APPLICATIONS

E. L. HOFMEISTER, W. E. SZCZEPANSKI, R. F. OOT, D. C. DALPE, and M. E. DAVIS (General Electric Co., Aircraft Equipment Div., Utica, NY) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 509-512.

A description is given of a flexible, computer-controlled multimode radar developed to exploit advanced air-to-ground radar system techniques for battlefield applications. The radar features an electronically scanned phased array and an airborne LSI radar signal processor that provides considerable mode flexibility as a consequence of the reconfigurable processor architecture. Multiple waveforms are generated digitally to increase the overall system flexibility. Among the radar mode capabilities are slow and fast moving target (MTI) wide area or sector search, MTI area track and track update, Doppler beam sharpening to provide a clutter reference background map for MTI detections, and SAR spotlight to image fixed target installations. The Modular Survivable Radar (MSR) system operates in the Ku band region with system bandwidths of 5 and 20 MHz. C.R.

A84-10866

NAVIGATION - AN OVERVIEW (INVITED PAPER)

S. H. DODDINGTON (ITT Corp., New York, NY) IEEE, Proceedings (ISSN 0018-9219), vol. 71, Oct. 1983, p. 1125, 1126

Some nontechnical factors which may influence the choice of a long-range navigation system are discussed. Particular attention is given to the institutional issue, having to do with questions of jurisdiction and liability, the 'CNI' (Communication, Navigation and Identification) factor, the particular needs of the marketplace (civil aviation or merchant marine) cost to the government, the

redundancy of systems, and vulnerability. It is predicted that the long-term trend in aviation will be towards self-contained aids for oceanic navigation, while that in marine service will depend on what the marker perceives to be cost effective. A.L.W.

A84-10867

CURRENT DEVELOPMENTS IN LORAN-C

R. L. FRANK IEEE, Proceedings (ISSN 0018-9219), vol. 71, Oct. 1983, p. 1127-1139. refs

A survey is provided of the many new developments in the Loran-C radio navigation system in recent years; in system coverage capabilities, and applications. These have come about as a result of new station installations and modern electronics. System techniques are reviewed and updated, information on radio propagation is summarized, and microprocessor-based receiver developments and solid-state ground transmitters are described. This has resulted in new applications of Loran-C to harbor navigation, civil aviation, and terrestrial uses, as well as extension of long-range capabilities. Extensive references are provided. Author

A84-10868#

OMEGA (INVITED PAPER)

E. R. SWANSON (U.S. Navy, Naval Ocean Systems Center, San Diego, CA) IEEE, Proceedings (ISSN 0018-9219), vol. 71, Oct. 1983, p. 1140-1155. refs

The Omega long-range navigation system, which uses eight VLF stations to provide global coverage for ships and aircraft, is reviewed. Particular attention is given to the history of the system, problems of system implementation, transmitting station equipment, synchronization procedures, signal and reception format, system performance, receiver evolution in light of human factors considerations, and specialized use of Omega for relative navigation, wind measurement, position-monitoring, land navigation, velocity measurement and timing. Other VLF navigational techniques are also noted. The propagation characteristics of VLF signals are discussed as they relate to both the advantages and limitations of a VLF-based navigation system with global coverage, and problems of propagation prediction are addressed. Consideration is finally given to the future of Omega in the environment of new satellite navigation systems. A.L.W.

A84-10870

NAVSTAR - GLOBAL POSITIONING SYSTEM - TEN YEARS LATER (INVITED PAPER)

B. W. PARKINSON and S. W. GILBERT (Intermetrics, Inc., Cambridge, MA) IEEE, Proceedings (ISSN 0018-9219), vol. 71, Oct. 1983, p. 1177-1186. refs

The development of the NAVSTAR Global Positioning System (GPS) is traced from the inception in 1973 of the Joint Program Office charged with the design of a single navigation system to meet the needs of all components of the Department of Defense. The developing technologies that made possible the design of the GPS in 1973 are examined, including advances in space system reliability, atomic clocks, quartz oscillators, satellite tracking and ephemeris prediction, spread-spectrum transmission, and large-scale integrated circuits. The overall system concept, comprising a space segment using 18 primary satellites deployed in six orbital planes, a ground-control segment involving several monitor stations, a master control station and three upload stations, and the user equipment segment, designed to serve a broad spectrum of users on land, at sea, in the air and in space, is then presented. Results of testing of various user equipment models are noted which have demonstrated achievable system accuracies of 7 m (50 percent confidence level) and 17 m (90 percent confidence level). A.L.W.

A84-10871

CIVIL GPS FROM A FUTURE PERSPECTIVE (INVITED PAPER)
T. A. STANSELL, JR. (Magnavox Co., Marine and Survey Systems Div., Torrance, CA) IEEE, Proceedings (ISSN 0018-9219), vol. 71, Oct. 1983, p. 1187-1192.

Civil applications of the GPS are discussed from the viewpoint of the future, as yet unplanned-for, uses for the system now under development. It is argued that cost reduction (to \$500 a set) and simplicity of operation will lead to broad civil acceptance. Some possible civil applications of GPS in offshore geophysical survey and exploration, land surveys, aircraft navigation, hand-held navigation and automobile navigation are discussed. Issues in the current design of GPS which would have to be overcome in order to permit such widespread application are identified, including access to the L2 frequency, user charges, differential GPS standards, global mapping standards, and equipment pricing strategies. A.L.W.

A84-10873

NAVIGATION SYSTEMS PERFORMANCE VERSUS CIVIL AVIATION REQUIREMENTS

L. HOGLE (Mitre Corp., McLean, VA), K. MARKIN (RJO Enterprises, Crofton, MD), and J. W. BRADLEY (FAA, Washington, DC) IEEE, Proceedings (ISSN 0018-9219), vol. 71, Oct. 1983, p. 1208-1213.

Navigation systems considered as candidates for meeting post-1995 requirements in civil aviation are presented and compared as regards their ability to satisfy both current and projected requirements. Facilities used and techniques employed for navigation purposes are presented for Loran-C, Omega, Omega/VLF, NAVSTAR GPS, VHF Omnidirectional Range (VOR), DME, VOR/DME, DME/DME, INS and Doppler navigation. System performances are then examined with respect to system-use accuracy, comprising equipment error and flight technical error, under a variety of operational environments, and in terms of coverage stability. On the basis of these comparisons, it is recommended that a mix of VOR, DME, Loran-C, Omega/VLF and INS navigation techniques be maintained to satisfy current and projected requirements. The civil applicability of the eventual GPS configuration is considered too uncertain to judge at the present time. A.L.W.

A84-10874

RADIONAVIGATION SYSTEM INTEGRITY AND RELIABILITY

R. BRAFF, C. A. SHIVELY, and M. J. ZELTSER (Mitre Corp., McLean, VA) IEEE, Proceedings (ISSN 0018-9219), vol. 71, Oct. 1983, p. 1214-1223. refs

The criteria of integrity and reliability are discussed as they relate to the evaluation of a navigation system for the particular example of radionavigation systems for civil aviation within the National Airspace System. Consideration is given to the integrity standards developed for the instrument landing system and microwave landing system, and to the reliability statistics of these systems. Integrity and reliability are also analyzed for VOR/DME, and it is noted that reliability is comparable to nonredundant ILS/MLS. The integrity and signal-coverage reliability of the proposed NAVSTAR GPS are then evaluated, and measures that would enhance these functions for civil users are suggested. A.L.W.

A84-10890#

HOW LOCKHEED CUT AVIONICS FAILURES

Astronautics and Aeronautics (ISSN 0004-6213), vol. 21, Nov. 1983, p. 28, 30.

The manufacturer of the S-3B carrier-based ASW aircraft has undertaken six steps to improve the reliability of its avionics, including conservative performance prediction, greater reliability of individual components, the derating of stress levels, improved thermal design and verification practices, a failure-free equipment burn-in procedure, and random vibration testing. New S-3B avionics systems contain microprocessors that perform comprehensive self-tests, often in less than 5 min. System self-test has become the sole criterion at all levels of maintenance, and assures that problems experienced are found and corrected. O.C.

A84-11504

AVIONICS ANALYSED. V - AIRCRAFT BRAIN POWER

M. HIRST Air International (ISSN 0306-5634), vol. 25, Nov. 1983, p. 231-234.

The implementation of computer software and hardware in aircraft control and avionics systems is discussed. Military strike aircraft have nearly 100 microprocessors. The Arinc 429 data bus system features highway-like data transmission channels through which all the microprocessors can transmit data, and is used on the A 310, 757, and 767 aircraft. A multisource/multisink data bus, MIL-STD-1553 was developed for military aircraft in the 1970s, and is being installed as custom-designed computers are manufactured. The computers are taking the form of remote terminals and bus controllers, governing routing and traffic flow, respectively. M.S.K.

A84-11621

TRAFFIC-WATCH

J. M. RAMSDEN International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 201-206.

The feasibility of providing pilots with displays which signal the bearing and proximity of other aircraft is assessed, together with equipment that will be needed to handle a potential doubling of air traffic by the year 2000. A Traffic-Watch display is described that would be fed from a data-link to the ground. All transponder-equipped aircraft would be located and position transmitted to all other commercial aircraft. Monopulse radar interrogators operating in a modified Mode S could furnish the data stream for the displays by activating the identify and altitude transponder on aircraft. It is noted that the monopulse system can be implemented without altering equipment currently used on commercial aircraft. M.S.K.

A84-11742#

A WORLDWIDE CIVIL SATELLITE NAVIGATION SYSTEM

C. ROSETTI (ESA, Paris, France) International Astronautical Federation, International Astronautical Congress, 34th, Budapest, Hungary, Oct. 10-15, 1983. 13 p. (IAF PAPER 83-90)

The configuration, operations, and economics of the Navsat Global Positioning System (GPS) are outlined. The operational system will feature, space and ground segments, a control network, and a signal structure. The GPS is intended to provide worldwide coverage, intrinsic redundancy, reliability, be nonsaturable, be amenable to low cost/medium precision and high cost/high precision navigation receivers, and operate in a decentralized mode. The 24 satellites will be spread over three 12-hr orbits with a 55 deg inclination to one another. The signals will be in a TDMA burst mode, with each burst featuring a CW, low bit rate, spread spectrum signal. The ground control segment generates, distributes, and establishes the uplink, provides satellite ephemeris and time synchronization, and monitors the satellite condition. The GPS system, usable by car fleets, emergency and transportation vehicles, the police, ATC outside of radar coverage, and vehicles carrying hazardous materials, will cost about \$1.6 billion at a rate of \$300 million/yr, and will produce indirect savings that offset the costs. M.S.K.

A84-11918

DIGITAL SIMULATION OF AN OPTIMAL FLIGHT GUIDANCE AND CONTROL COMPUTER SYSTEM

C.-F. LIN and K. L. HSU (Michigan, University, Ann Arbor, MI) IN: World Congress on System Simulation and Scientific Computation, 10th, Montreal, Canada, August 8-13, 1982, Proceedings. Volume 2. Montreal, International Association for Mathematics and Computers in Simulation, 1983, p. 61-63

It is pointed out that the onboard flight guidance and control system of a supersonic fighter aircraft consists of a mission computer and a flight control computer. The mission computer generates real-time, on-line optimal trajectories, while the flight control computer tracks the optimal trajectories generated by the mission computer. In the present investigation, both the mission computer and the flight control computer are simulated in real-time,

on-line operations in order to check the computational speed requirements of the algorithms prior to their implementation in real hardware. Attention is given to the equations of motion, aspects of optimal control, optimal thrust control, optimal aerodynamic control, and the obtained simulation results. G.R.

A84-11984#
ACCURACY ANALYSIS IN INERTIAL NAVIGATION SYSTEMS
[GENAUIGKEITSANALYSE VON TRAEGERHEITSNAVIGATIONSSYSTEMEN]

N. LOHL Braunschweig, Technische Universitaet, Fakultae fuer Maschinenbau und Elektrotechnik, Dr.-Ing. Dissertation, 1982, 154 p. In German. refs

A statistical analysis of the output of a strapdown-type inertial navigation system in HFB-320 and CCV-F104 flight tests is used to generate a digital nonrecursive trend filter to divide the signal recorded during one time interval into a low-frequency varying trend and high-frequency, presumably steady noise component. The noise component is then modeled using higher-order autoregressive methods, and its detrimental effects on the accuracy of the system are quantified. By continuously computing the errors in position, angle, and speed of the unfiltered and filtered output signal, the actual noise contribution to system error is determined and compared to that predicted by the noise model, good agreement is found. Numerous graphs and diagrams illustrate the findings. T.K.

A84-12185
AIRSPACE MANAGEMENT CAN BE IMPROVED

C. BENTON (International Civil Aviation Organization, Technical Assistance Bureau, Montreal, Canada) ICAO Bulletin, vol. 38, Sept. 1983, p. 18-21

The objectives of the Air Traffic Services system, as stated in the ICAO's Annex 11, are the prevention of collisions between aircraft (especially in maneuvering areas), the provision of advice and information useful for the safe and efficient conduct of flights, and the notification of the appropriate authorities of aircraft in need of search and rescue activities. Above all, an orderly flow of traffic must be maintained. Attention is given to the additional need for civil-military cooperation for these tasks in flight information regions (FIRs) where military authorities have appropriated large airspace areas. It is noted that some FIRs include, by international agreement, airspace over high seas where the state concerned, while providing air traffic services, does not exercise sovereignty. O.C.

A84-12186
ATC DESIGN STANDARDS - EQUIPMENT ORIENTATION VERSUS SYSTEMS ORIENTATION

M. R. HOOD (International Civil Aviation Organization, Technical Assistance Bureau, Montreal, Canada) ICAO Bulletin, vol. 38, Sept. 1983, p. 22-25.

Flexibility, in particular the ability to expand beyond initial capabilities, is essential to air traffic control (ATC) facilities and their supporting communications and navigational systems. Commonly found among the services which are required for the upgrading of any operational center originally designed to provide minimal services are additional multi-channel HF and VHF telecommunications facilities, monitoring and control of additional navigational aids and power supply facilities, emergency services, and the addition of signal processing and automatic switching to communications facilities. Attention is presently given to the problems that arise in the course of such expansion programs, from the viewpoints of functional versatility, maintainability, and reliability. O.C.

A84-12187
DERD-MC - A MODULAR, DISTRIBUTED-PROCESSING ATC SYSTEM

J. BURKLEY (Raytheon Co., Lexington, MA) ICAO Bulletin, vol. 38, Sept. 1983, p. 26-29

The 'Display of Extracted Radar Data-Minicomputer' (DERD-MC) system is a state-of-the-art, modular device for distributed

processing which embodies a sophisticated understanding of the West German Federal Administration of Air Navigation Services tasks. The DERD-MC system processes and presents radar and other data to ATC personnel on computer-controlled synthetic situation displays, with its minicomputer linking a network of long, medium and short range radars and radio direction finders. The DERD-MC system is currently in operation at the four Regional Air Navigation Service Units located in Frankfurt, Bremen, Dusseldorf and Munich, where up to six radars may be accessed. O.C.

A84-12188
HF GROUND-AIR COMMUNICATIONS ARE STILL ALIVE AND WELL

J. A. LAMBERT (C & S Antennas, Ltd., England) ICAO Bulletin, vol. 38, Sept. 1983, p. 32-36

Attention is given to the propagation characteristics and other criteria that must be considered in the selection of antennas for HF ground-air communications. The dominant component in a transmission will vary according to whether the path is parallel or perpendicular to the earth's magnetic field when transmission is in the vicinity of the geomagnetic equator. Attention is given to the characteristics of wideband dipole, horizontally polarized log-periodic (both single and twin-mast), and wideband biconical HF antenna configurations. The MTBF of antennas used in aeronautical communications must be of the order of 10,000 hours. As few types of antennas as possible should be used on a given site to allow antennas to be switched from service to service during maintenance periods, and to reduce the range of spares required to an economical minimum. O.C.

A84-12189
NEW SURVEILLANCE RADAR PLANNED FOR INSTALLATION AT OVER 100 U.S. AIRPORTS

C. PRIMEGGIA (FAA, Washington, DC) and C. F. PHILLIPS (Westinghouse Electric Corp., Pittsburgh, PA) ICAO Bulletin, vol. 38, Sept. 1983, p. 37-40.

The ASR-9 airport surveillance radar system currently under development employs a dual feed to generate upper and lower elevation beams, of which the upper is used for short range reception, and the lower for longer ranges. In order to optimize the use of this dual-beam configuration, the technique of range and azimuth gating (RAG) is incorporated. RAG uses a stored map to switch between upper and lower beams as a function of azimuth. In addition, a filter centered at zero velocity is used in conjunction with a 'fine grain clutter map' to store the amplitude of the ground clutter received by the radar through 360 deg in azimuth. Over a period of six radar scans, the map subtracts the ground clutter amplitude from the output of a normal (or non-Doppler) portion of the ASR-9's Moving Target Detection receiver. O.C.

A84-12352#
FLIGHT TEST AND EVALUATION OF THE A-10 SINGLE-SEAT NIGHT ATTACK AVIONICS

G. KAILIWAI, III and J. W. MATTHEWS (USAF, Flight Test Center, Edwards AFB, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983 12 p. (AIAA PAPER 83-2767)

This paper describes the major A-10 single-seat night attack avionics systems, the test procedures used to evaluate each system, the results of the test program, and some recommendations. The test program satisfied all major avionics test objectives by developing and employing new and innovative test procedures. The results of the evaluation provide an insight into the effectiveness of the test procedures and the A-10's night attack avionics systems. This paper is also intended to serve as a partial guide for testing future night attack avionics systems.

Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

A84-12353#

AIR-TO-AIR RADAR FLIGHT TESTING

R. SCOTT (USAF, Flight Test Center, Edwards AFB, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 11 p.
(AIAA PAPER 83-2768)

The present investigation is concerned with the test and evaluation of modern pulse Doppler multimode air-to-air radar systems, giving particular attention to the primary air-to-air radar modes and capabilities in a fighter-type installation. The term fighter, as used in the investigation, refers to the test radar-equipped aircraft. The considered targets are airborne single and multiple similar and dissimilar aircraft. General information concerning test techniques is discussed, taking into account the system specification, test plans, and support requirements. Test techniques regarding the capability to detect an airborne target are considered along with questions of manual acquisition, automatic acquisition capabilities, the tracking of single and multiple targets, and the radar computer capability. G.R.

A84-12354#

FLIGHT TESTING OF THE AUTOPILOT AND TERRAIN FOLLOWING RADAR SYSTEM IN THE TORNADO AIRCRAFT

T. FLECK (Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 10 p.
(AIAA PAPER 83-2770)

The Tornado aircraft, a trinational development, is a fighterbomber with variable wing geometry. It is equipped with a terrain following radar and a digital Autopilot and Flight Director System that is already released for service operation and is at present in the final stage of flight testing. The demonstration of system performance and integrity required the development of evaluation methods that especially considered the dynamic nature of the terrain following mode. This paper gives an overview of the flight test activities on this subject and addresses the selected methods used to determine the system performance. Author

A84-12361#

USING MT-DARC AND FAA RADARS FOR MISSION MANAGEMENT AT THE AFFTC

D. C. BYERS and W. L. KUPFERER (USAF, Range Div., Edwards AFB, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 5 p. refs
(AIAA PAPER 83-2781)

This paper discusses the Mosaic and Tracking Direct Access Radar Channel (MT-DARC) and Federal Aviation Agency (FAA) radars as used in managing range missions at the Air Force Flight Test Center. It was found that through innovative thinking an air traffic control system could be utilized in range applications along with mission control and air traffic control. The equipment was originally procured for the R-2508 Enhancement Program to modernize facilities that are directing and controlling aircraft in the Joint Use Airspace of the Mojave Desert. Current range applications have resulted in a 77-percent increase in mission support, a 67-percent decrease in the utilization of instrumentation radars to provide space positioning for non-data-gathering missions, a 29-percent increase in Mission Control Center services and shared usage of special use areas that were formerly sterilized airspace. Author

A84-12426

PLANS '82 - POSITION LOCATION AND NAVIGATION SYMPOSIUM, ATLANTIC CITY, NJ, DECEMBER 6-9, 1982, RECORD

Symposium sponsored by the Institute of Electrical and Electronics Engineers New York, Institute of Electrical and Electronics Engineers, 1982, 419 p.

Topics related to satellite navigation are discussed, taking into account the development of a satellite position location system for aircraft and boat distress beacons, the design and measured performance of an experimental GPS navigation receiver for general

aviation, the evaluation of the ionospheric refraction correction algorithm for single-frequency Doppler navigation using Tranet-II data, the first results of the Cospas-Sarsat system flight tests, and a satellite-based concept for ATC position determination and data-link services. Other subjects explored are concerned with undersea navigation, terrestrial-based radio navigation, the navigation of space vehicles, integrated communications and navigation systems, and mapping geodesy. Attention is also given to integrated flight management, navigation/position location in support of energy, self-contained navigation, and time and frequency applied to navigation systems. G.R.

A84-12427*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

DEVELOPMENT OF SATELLITE POSITION LOCATION SYSTEM FOR AIRCRAFT AND BOAT DISTRESS BEACONS

D. R. KAHLE (NASA, Goddard Space Flight Center, Greenbelt, MD) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 1-4.

An international satellite system for the detection and location of distress beacons carried on aircraft and vessels is in its technical checkout phase. User demonstration and evaluation (D&E) will start in early 1983 and continue for two years. The D&E phase and a subsequent transition period will form the basis for improved search and rescue operations for the 1980's and beyond. The system, called COSPAS/SARSAT, has international participation involving the U.S., Canada, and France as SARSAT members and joint participation with the Soviet Union's COSPAS Project. Norway and the U.K. have recently joined as investigators. Average position location error of the satellite aided processing is expected to be from 10-20KM for the existing 121.5/243 MHz distress beacons and from 2-5KM for experimental beacons transmitting in the 406 MHz band. Author

A84-12428

THE DESIGN AND MEASURED PERFORMANCE OF AN EXPERIMENTAL GPS NAVIGATION RECEIVER FOR GENERAL AVIATION

A. BUIGE (FAA, Washington, DC), R. R. LAFREY, and S. D. CAMPBELL (MIT, Lexington, MA) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 5-12. Sponsorship: U.S. Department of Transportation.
(Contract DOT-FA77WAI-757; DOT-FA78WA-4216)

It was found in a study conducted by the FAA that the Global Positioning System (GPS) has the technical potential to satisfy nearly all enroute and nonprecision approach navigation requirements for typical general aviation aircraft. Remaining questions were related to cost considerations. An investigation was, therefore, conducted with the aim to develop and test a GPS navigation system for civil aviation. The system design was specified to meet FAA accuracy requirements for area navigation systems and to use techniques which could lead to low cost commercial avionics. A description is presented of the GPS test and evaluation system, and preliminary flight test results are provided. G.R.

A84-12429

EVALUATION OF THE IONOSPHERIC REFRACTION CORRECTION ALGORITHM FOR SINGLE-FREQUENCY DOPPLER NAVIGATION USING TRANET-II DATA

W. J. GECKLE and M. M. FEEN (Johns Hopkins University, Laurel, MD) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 13-21.
(Contract N00024-81-C-5301)

An ionospheric refraction correction algorithm has been developed to correct single-frequency Doppler measurements made with the TRANSIT navigation system. The performance of the algorithm was recently evaluated using measurements of electron content acquired from TRANET-II tracking stations. The

algorithm met our a priori requirement for correcting more than 50 percent of the ionospheric error. A description of the algorithm, the TRANET-II data set, and the mechanics of the algorithm evaluation process are described below. Author

A84-12430#

DIFFERENTIAL-GPS - A NEW APPROACH

J. M. LIGON (U.S. Coast Guard, Washington, DC) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 22-27.

Several methods of Differential-GPS have been proposed. All of them treat NAVSTAR-GPS as a global system with local differential corrections. This paper attempts to look at Differential-GPS from the point of view of a local precision navigation system using remote signal emitters. A new method, Differential Time GPS, is described. This method is capable of simplifying user equipment and making Differential-GPS reliable enough for precision users. Author

A84-12431

DME/P - THE NEW INTERNATIONAL STANDARD

R. J. KELLY (Bendix Corp., Communications Div., Baltimore, MD) and G. JENSEN (FAA, Washington, DC) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 42-55. Sponsorship: U.S. Department of Transportation. refs
(Contract DOT-FA01-82-C-10017)

The present investigation is concerned with the integration of the functions of the precision distance measuring equipment (DME/P) with those of the DME/N. The DME/N represents a radio aid to navigation which provides distance information in the aircraft by measuring total round-trip time between interrogations from an airborne transmitter and replies from a ground transponder. The system engineering problem arising in connection with the desired integration is discussed along with DME/P operational requirements, DME operation with the 2-pulse/2-mode technique, details regarding the pulse shape, the pulse time of arrival estimation technique, the channel plane, questions of system efficiency, the importance of a multipath solution, signal processing, and DME error and power budgets. G.R.

A84-12432#

THE OMEGA NAVIGATION SYSTEM - AN OVERVIEW

W. K. MAY (U.S. Coast Guard, Washington, DC) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 56-61

OMEGA is a long-range, ground-based, very low frequency (VLF) radionavigation system which provides continuous, world-wide position information to both airborne and marine users. Started in the late 1960's the OMEGA system was completed in August 1982, when OMEGA Station Australia became operational. Although design system accuracy was four nautical miles, realizable fix accuracy is one to two nautical miles over much of the world. This paper overviews the OMEGA Navigation System with emphasis on system operation and user services. Author

A84-12433* Bolt, Beranek, and Newman, Inc., Cambridge, Mass

FAULT TOLERANT NAVIGATION IN A MICROWAVE LANDING SYSTEM ENVIRONMENT

A. K. CAGLAYAN and R. E. LANCRAFT (Bolt Beranek and Newman, Inc., Cambridge, MA) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 70-75. refs
(Contract NAS1-16579)

This paper describes the failure detection and isolation performance of a sensor fault tolerant system for the NASA Terminal Configured Vehicle (TCV) research aircraft in a Microwave Landing System (MLS) environment. The objective of the fault

tolerant system is to detect failures in navigation-aid instruments and on-board sensors and to provide reliable estimates for the aircraft states in the possible presence of these sensor malfunctions. Analytic redundancy, which exists between the various sensor outputs due to the aircraft point mass equations of motion, is used to identify sensor failures. State estimates are used by an automatic guidance and control system to land the aircraft along a prescribed path. Author

A84-12434

THE IMPACT OF CROSS-RATE INTERFERENCE ON THE ACQUISITION AND TRACK MODES OF LORAN-C RECEIVERS

M. J. ZELTSER and M. B. EL-ARINI (Mitre Corp., McLean, VA) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 76-84. refs

A recent report (Wong, 1982) recommends that sixteen additional Loran-C ground stations are needed to provide redundant coverage throughout the conterminous U.S. so that Loran-C can provide the primary navigation service to civil aviation. The purpose of this paper is to estimate the effect of the interference from the additional stations on the acquisition (phase code identification and third cycle selection) and track modes of a low cost Loran-C receiver. The detection process of the receiver is based on the sequential decision theory. This model was selected because it resembles the operation of a proposed, microprocessor based Loran-C receiver for general aviation application, and because sequential decision theory produces the minimum acquisition time. The results are compared against the requirement that acquisition be completed 90 percent of the time within 7.5 minutes. The impact of cross rate interference (CRI) on the track mode is estimated using a time domain analysis so that its effect on aircraft performance can be estimated. Author

A84-12441

THE FULL SCALE DEVELOPMENT OF US NAVY DTDMA JTIDS INTEGRATED COMMUNICATIONS NAVIGATION-IDENTIFICATION TERMINALS

J. RUBIN (ITT, Avionics Div., Nutley, NJ) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 126-135.
(Contract N00039-82-C-0071)

It is pointed out that the Joint Tactical Information Distribution System (JTIDS) is an Integrated Communications Navigation and Identification (ICNI) system, which features pseudorandom frequency hopping, spread spectrum techniques, and a low duty cycle signal structure. JTIDS operates in the Lx portion of the frequency spectrum (960-1215 MHz). The performance characteristics of the system are related to anti-jam properties, precision ranging, and Relative Navigation and conventional TACAN functions. Attention is given to a full scale development (FSD) of U.S. Navy JTIDS Time Division Multiple Access (TDMA) terminals, taking into account the design features for JTIDS DTDMA FSD terminals, design highlights regarding a Class 2 tactical fighter terminal, and a shipboard/surface command control center. G.R.

A84-12442

GRID MERGING APPROACHES FOR JTIDS STAGE ONE OPERATION

J. E. SACKS (Intermetrics, Inc., Cambridge, MA) and J. BOLAND (U.S. Navy, Naval Electronic Systems Command, Washington, DC) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 136-143.

This paper examines the Grid Merging problem for implementation during Stage 1 Integration of the JTIDS terminal. Several different RelNav Algorithm redesigns, position report message modifications, and grid merging strategies are examined. It is concluded that grid merging poses no technical risks, and that for Stage 1 the simplest approach is the most reasonable. Also included is a mathematical formulation of an optimal grid merging time switching strategy problem. It is demonstrated that

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the problem may be solved by linear programming techniques.

Author

A84-12444

DESIGN AND DEVELOPMENT OF A SECOND GENERATION RELATIVE NAVIGATION ANALYTIC SIMULATOR FOR JTIDS FULL SCALE DEVELOPMENT

R. DUNN, C. ZANGARO, J. L. FOSTER, R. PURCELL, W. TSANG, D. WALDRON (Intermetrics, Inc., Warminster, PA), and G. SAVAGE (U.S. Naval Materiel Command, Naval Air Development Center, Warminster, PA) IN PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record . New York, Institute of Electrical and Electronics Engineers, 1982, p. 159-165.

The Joint Tactical Information Distribution System (JTIDS) Distributed Time Division Multiple Access (DTDMA) Full Scale Development (FSD) terminal, which is now being developed, is to provide a relative navigation function by combining available dead reckoner information with Time of Arrival (TOA) measurements on Precise Position, Location, and Identification (PPLI) messages. This objective is to be accomplished with the aid of an algorithm running in computers embedded in the terminal. The Second Generation Relative Navigation Analytic Simulator (RNAS-II) is a computer program designed to aid in the development and study of this algorithm. In the design of RNAS-II it became necessary to implement a number of features of real-time discipline. The present investigation is concerned with an illustration of the use of these real-time methods in a non-real-time environment, taking into account the realized benefits

G R

A84-12447

TACTICAL FLIGHT MANAGEMENT - SYSTEM DEFINITION

W. J. MURPHY (McDonnell Aircraft Co., St. Louis, MO) and W. L. YOUNG, JR (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record . New York, Institute of Electrical and Electronics Engineers, 1982, p. 182-188.

(Contract F33615-81-C-3601)

In a recent flight test demonstration at Holloman AFB, a USAF/McDonnell Douglas F-15B demonstrated the capability to blend or 'couple' fire control and flight control signals together automatically for increased air-to-air gunnery accuracy during high-aspect angle, maneuvering flight. This was the first step in significantly improving the performance and survivability of tactical aircraft by integrating fire control, navigation, flight and propulsion control, and crew station technologies. The Tactical Flight Management program addresses this technology integration. Its system definition phase was recently completed and is reported herein. Preliminary system design is now underway and pilot-in-the-loop evaluation will take place in 1984.

Author

A84-12448

ANALYSIS OF FUTURE NAVIGATION REQUIREMENTS FOR HIGHER CAPACITY IN TERMINAL MANEUVERING AREAS

S. C. MOHLEJI and M. J. ZELTSER (Mitre Corp., McLean, VA) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record . New York, Institute of Electrical and Electronics Engineers, 1982, p. 189-197. Sponsorship: U.S. Department of Transportation. refs

(Contract DOT-A01-82-C-10003)

In this paper, the performance requirements of accuracy, coverage and channel capacity for a rho/theta navigation system are analyzed for congested terminal maneuvering areas (TMA). The TMA environment assumed automated air traffic control (ATC) and homogeneous traffic where all aircraft are equipped with flight management systems. The accuracy requirements are determined from the interrelationship between ATC procedures and navigation system performance. This is accomplished by estimating the impact of uncertainties in navigation, ground speed estimation including winds, surveillance and delay in communications on the landing time dispersions. The coverage requirement is derived by analyzing the impact of navigation system transition between the en route

and TMA at 10 high density airports. The channel capacity is determined by estimating the number of aircraft that can request navigation service simultaneously. In addition, a methodology is presented to compare navigation system implementation based on economic considerations, that can be used by any country to assess their own needs.

Author

A84-12449

A PROPOSED ELECTRONIC HORIZONTAL SITUATION INDICATOR FOR USE IN GENERAL-AVIATION AIRCRAFT

S. A. DYER (Kentucky, University, Lexington, KY) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record . New York, Institute of Electrical and Electronics Engineers, 1982, p. 198-205

The pilots with the heaviest workload seem to be those in general-aviation who fly single-pilot IFR. The present-day display and microprocessor technologies are developed to the extent that it would be possible to provide an electronic horizontal situation indicator (EHSI) to the general-aviation community at an affordable price. The results of interviews with general-aviation pilots having from 200 to over 4000 hours flight experience are summarized, and figures shown exemplifying information as it would appear on the EHSI. A block diagram of the EHSI, as well as a brief discussion of currently available system components, are included.

Author

A84-12451#

AN ALL-PURPOSE INERTIAL NAVIGATION CONCEPT FOR TACTICAL MISSILE SYSTEMS

H. V. WHITE (U.S. Army, Missile Laboratory, Redstone Arsenal, AL) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record . New York, Institute of Electrical and Electronics Engineers, 1982, p. 246-253. refs

This paper deals with several current and conceptual systems for performing the functions of alignment, land and flight navigation of tactical missile systems. Systems for performing all three functions are described and a preferred concept is formulated based on an existing inertial measurement system. The system was originally designed to perform the alignment and flight navigation functions. It is also particularly well suited to perform land navigation with only the addition of appropriate software and certain external aids and their interfaces. Formulation of the land navigation function is emphasized.

Author

A84-12456

PRECISION OSCILLATORS AND THEIR ROLE AND PERFORMANCE IN NAVIGATION SYSTEMS

H. FRUEHAUF (Eratom California, Inc., Irvine, CA) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record . New York, Institute of Electrical and Electronics Engineers, 1982, p. 289-301. refs

The high performance quartz crystal oscillator is considered along with the atomic oscillators. The basic principle used in the case of the atomic oscillators is based on the utilization of a microwave transition in the atom of interest. This transition provides a highly stable frequency reference to which the frequency of an inexpensive voltage-controlled crystal oscillator can be locked. The atomic oscillators discussed include the rubidium atomic oscillator, the cesium beam atomic oscillator, and the hydrogen maser atomic oscillator. The characteristics of the three atomic oscillators are compared, and future developments are evaluated. The passive hydrogen maser is expected to be available on the open market in 1983/84. The cost is expected to be near that of high-performance cesium options, while there will be an advantage over the cesium device with respect to physics life.

G.R

A84-12458#

GPS/SSN INTEGRATION

H. SCHOENFELD and E. T. MCCRAY (U.S. Naval Materiel Command, Naval Air Development Center, Warminster, PA) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 314-318.

Full-scale engineering development (FSED) models of the Global Positioning System User Equipments are being integrated into Attack Class Submarines SSN for the purpose of determining GPS performance and utility in a submarine environment. The GPS offers potential significant operational enhancements of improved security as a result of reduction in time to first fix and of availability of a time standard for shipboard use. Additionally, the GPS provides significant improvement in reference position accuracy. This paper provides an overview of the candidate SSN GPS User Equipments, an overview of the proposed integration aboard the SSN 701 for the Development Test and Evaluation Operational Readiness (DT&E(OR)) portion of FSED and a discussion of the GPS utility to SSN operations. Author

A84-12461

THE ONI-7000 AIRBORNE LORAN-C SYSTEM

A. W. MARCHAL (Offshore Navigation, Inc., New Orleans, LA) and B. O. FRANCIS IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 333-338.

It is pointed out that the ONI-7000 is the first major advance in commercial Loran-C technology since the model 5000 computer controlled Loran-C system was introduced in 1969. The three major components of the ONI-7000 include the control display unit (CDU), the receiver computer unit (RCU), and the antenna. Attention is given to the display function selector, the functions of the power switch, a set of annunciator lights, the unique way by which the system processes the Loran-C signals, the 'dedicated Triad' feature, and the propagation model used for station selection and skywave discrimination. G.R.

A84-12464

DEVELOPMENT OF AN AIR FORCE RLG STRAPDOWN STANDARD NAVIGATOR

M. A. GALLO (Honeywell, Inc., Avionics Div., Minneapolis, MN) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 361-373.

It is pointed out that conventional gimbaled inertial navigation systems are characterized by performance limitations and high life-cycle costs (LCC). Strapdown inertial systems provide a promising approach for improving reliability and maintainability, and for reducing acquisition costs. The development of strapdown systems is based on the utilization of low-cost, high-speed digital electronics and the ring laser gyro (RLG). Advantages of the laser gyro for strapdown applications are related to high accuracy, wide dynamic range, fast reaction time, stability, and environmental ruggedness. The principal drawback is currently the volume required to package the larger RLG sensors into existing system volumes. The present investigation is concerned with approaches for solving the packaging problems, taking into account the development of an RLG strapdown Standard Navigator (H-423) meeting U.S. Air Force requirements. G.R.

A84-12465

DESIGN OF RLG INERTIAL SYSTEMS FOR HIGH VIBRATION

J. G. MARK, R. E. EBNER, and A. K. BROWN (Littion Systems, Inc., Woodland Hills, CA) IN: PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record. New York, Institute of Electrical and Electronics Engineers, 1982, p. 379-385.

Ring laser gyros are now being specified for a number of high performance, high vibration military applications, as part of strapdown inertial navigation systems. In some of these applications, the INS not only provides the normal navigation and

attitude outputs, but it also is used as the inertial reference for flight control with outputs of angular rate and acceleration specified. This paper describes strapdown INS output errors produced by a high vibration environment and design guidelines for their control. Installation criteria, vibration isolator selection, mechanical design features, and computer algorithm selection and iteration rates are defined. Navigation and flight control requirements produce some contradictory results leading to engineering design compromises. Author

A84-12775

THE TADS/PNVS - THE EYES OF THE APACHE

D. P. WRAY (U.S. Army, Washington, DC) Vertiflite (ISSN 0042-4455), vol. 29, Nov-Dec. 1983, p. 42, 43.

Attention is given to the design features and development status of the AH-64 Apache helicopter's Target Acquisition Designation Sight/Pilot Night Vision Sensor (TADS/PNVS), by means of which this attack helicopter can fly, during either day or night, and in adverse weather conditions, nap-of-the-earth missions delivering a variety of ordnance efficiently and accurately. All TADS sensors are boresighted to a common line-of-sight, and are located in the lower turret for use by the copilot-gunner for target search, detection and designation. The PNVS is located in the upper turret and operates independently of TADS, being used primarily for navigation and piloting functions. The TADS/PNVS production program is already underway. O.C.

N84-10004# Joint Publications Research Service, Arlington, Va. START AUTOMATED TRAFFIC CONTROL SYSTEM OPERATIONAL AT KRASNODAR

S. OMELCHENKO IN: *its* USSR Rept.: Transportation, No. 126 (JPRS-84457) p. 7-8 3 Oct. 1983 refs. Transl. into ENGLISH from Vozdushnyy Transport (USSR), 5 May 1983 p. 1. Avail: NTIS HC A05

A recently installed automatic flight control system in the Krasnodar airport is discussed. Advantages of the new system are noted, as well as problems. The chief problem is a shortage of automatic transponders on the Yak-40 aircraft and their total absence on the L-410. R.J.F.

N84-10041*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif**DEVELOPMENT AND FLIGHT TEST OF AN X-BAND PRECISION APPROACH CONCEPT FOR REMOTE-AREA ROTORCRAFT OPERATIONS**

G. R. CLARY and J. P. CHISHOLM (Nevada Univ., Reno) Aug. 1983 11 p refs. Presented at the IEEE/AIAA 5th Digital Avionics Systems Conf., Seattle, 31 Oct - 3 Nov. 1983 (NASA-TM-84398; A-9442, NAS 115:84398) Avail: NTIS HC A02/MF A01 CSCL 17G

A novel airborne radar-based precision approach concept was developed and flight tested as a part of NASA's Rotorcraft All-Weather Operations Research Program. A demonstration, transponder-based beacon landing system (BLS), incorporating state-of-the-art X-band radar technology and digital processing techniques, was built and flight tested to demonstrate the concept feasibility. The BLS airborne hardware consists of an add-on microprocessor, installed in conjunction with the aircraft weather/mapping radar, which analyzes the radar beacon receiver returns and determines range, localizer deviation, and glide slope deviation. The ground station is an inexpensive, portable unit which can be quickly deployed at a landing site. Results from the flight test program show that the BLS concept has a significant potential for providing rotorcraft with low-cost, precision, instrument approach capability in remote areas. Author

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N84-10042*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT EVALUATION RESULTS FROM THE GENERAL-AVIATION ADVANCED AVIONICS SYSTEM PROGRAM

G. P. CALLAS, D. G. DENERY, G. H. HARDY, and B. F. NEDELL
Aug. 1983 14 p refs Presented at the 5th IEEE/AIAA Digital Avionics Systems Conf., Seattle, Wash., 31 Oct. - 3 Nov. 1983 (NASA-TM-84397; A-9441; NAS 1.15:84397) Avail: NTIS HC A02/MF A01 CSCL 17G

A demonstration advanced avionics system (DAAS) for general-aviation aircraft was tested at NASA Ames Research Center to provide information required for the design of reliable, low-cost, advanced avionics systems which would make general-aviation operations safer and more practicable. Guest pilots flew a DAAS-equipped NASA Cessna 402-B aircraft to evaluate the usefulness of data busing, distributed microprocessors, and shared electronic displays, and to provide data on the DAAS pilot/system interface for the design of future integrated avionics systems. Evaluation results indicate that the DAAS hardware and functional capability meet the program objective. Most pilots felt that the DAAS representative of the way avionics systems would evolve and felt the added capability would improve the safety and practicability of general-aviation operations. Flight-evaluation results compiled from questionnaires are presented, the results of the debriefings are summarized. General conclusions of the flight evaluation are included. Author

N84-10043*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TIME CONTROLLED DESCENT GUIDANCE ALGORITHM FOR SIMULATION OF ADVANCED ATC SYSTEMS

H. Q. LEE and H. ERZBERGER Aug 1983 71 p refs (NASA-TM-84373; A-9372; NAS 1.15:84373) Avail: NTIS HC A04/MF A01 CSCL 17G

Concepts and computer algorithms for generating time controlled four dimensional descent trajectories are described. The algorithms were implemented in the air traffic control simulator and used by experienced controllers in studies of advanced air traffic flow management procedures. A time controlled descent trajectory comprises a vector function of time, including position, altitude, and heading, that starts at the initial position of the aircraft and ends at touchdown. The trajectory provides a four dimensional reference path which will cause an aircraft tracking it to touchdown at a predetermined time with a minimum of fuel consumption. The problem of constructing such trajectories is divided into three subproblems involving synthesis of horizontal, vertical, and speed profiles. The horizontal profile is constructed as a sequence of turns and straight lines passing through a specified set of waypoints. The vertical profile consists of a sequence of level flight and constant descent angle segments defined by altitude waypoints. The speed profile is synthesized as a sequence of constant Mach number, constant indicated airspeed, and acceleration/deceleration legs. It is generated by integrating point mass differential equations of motion, which include the thrust and drag models of the aircraft. DOE

N84-10044# Draper (Charles Stark) Lab., Inc., Cambridge, Mass.

MATERIALS RESEARCH FOR ADVANCED INERTIAL INSTRUMENTATION. TASK 2: GAS BEARING MATERIAL DEVELOPMENT Report, 1 Oct. 1981 - 30 Sep. 1982

D. DAS and K. KUMAR Dec. 1982 89 p refs (Contract N00014-77-C-0388) (AD-A130471; CSDL-R-1647; TRR-5) Avail: NTIS HC A05/MF A01 CSCL 17G

Chemical vapor deposition (CVD) studies were continued with formation of additional boron coatings on beryllium. Problems encountered earlier with respect to coating thickness non-uniformity were corrected by installing a feed-through to the CVD chamber which permitted rotation of the samples during deposition. Questions pertaining gas cylinder selected for the diborane gas used during CVD, were successfully addressed through control of

diborane gas concentration (by diluting it with Argon gas) and selection of an appropriate substrate temperature for deposition. Friction and wear tests performed on these recently formed coatings showed excellent wear resistance with very low friction coefficient values of the surfaces versus a diamond stylus serving as a pin. The performance against a sapphire pin, however, was quite poor with high measured values of the friction coefficient in agreement with observations reported earlier. These experiments indicated that the deposition temperature was not particularly critical in determining coating quality. Additional activities included Auger Electron Spectroscopy (AES) characterization of the surfaces that were tested for wear, and initiation of procedures for fabricating parts for evaluation after assembling into an actual gyro gas bearing configuration. Author (GRA)

N84-10045# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.

MARINE AIR TRAFFIC CONTROL AND LANDING SYSTEM (MATCALS) INVESTIGATION Final Technical Report, Apr. 1982 - Apr. 1983

E. S. SJOBORG, T. G. FARRILL, P. A. CLONINGER, B. PERRY, J. P. GARMON, and P. P. BRITT May 1983 155 p refs Prepared in cooperation with Auburn Univ., Alabama, and Flight Transportation Assoc., Inc., Boston, Mass.

(Contract N00039-80-C-0082) (AD-A130309; GIT/EES-A-2550-FTR) Avail: NTIS HC A08/MF A01 CSCL 17G

Georgia Tech investigated several areas relating to the development of the Marine Air Traffic Control and Landing System (MATCALS). Several factors relating to the specification and testing of the MATCALS Airport Surveillance Radar (ASR) were studied. These include: (1) MTI improvement factor. Models of the amplitude distributions and spectral characteristics are identified and explained in the light of specifications for an ASR system; (2) L-band versus S-band transmit frequency considerations are enumerated with emphasis on the phenomenological limitations of the MTI improvement factor; (3) Three methods of measuring a radar's minimum detectable signal level are discussed. These include direct measurement, determination of the tangential sensitivity, and noise figure measurement; and (4) Remoting of the MATCALS CCS from the ASR using a fiber optic data link was investigated. Data from the AN/TPN-22 test flight program is also presented. The statistical analysis methods are explained and effects of the multipath fence and enhanced F-4J target are explored. A preliminary conclusion from the brief analysis is that the major source of azimuth tracking error in the radar itself. GRA

N84-10046# Federal Aviation Administration, Atlantic City, N.J. Technical Center.

OMEGA DATA BANK Technical Data Report, 1980 - 1981

T. TURNOCK Jun. 1983 33 p refs (AD-A131089; DOT/FAA/CT-82/97) Avail: NTIS HC A03/MF A01 CSCL 05B

The International Bank for Airborne-Omega Data continued operation at the Federal Aviation Administration Technical Center. This report, issued by the Data Bank, is based upon 355 flight data hours covering flights in the North and South Atlantic, parts of the Caribbean, Central and South America, Canada, and the North Pacific. These data were collected during the winter of 1980 through spring 1981. There were three major contributors to the Omega Data Bank during this period operating the same equipment types. Operationally usable signals corresponded quite well with Omega signal coverage prediction diagrams published by Omega Navigation System Operational Detail. Exceptions were noted from Ellesmore Island over the Arctic Ocean for the Liberia, Hawaii, North Dakota, and Japan signals for the specific months and times of the data flights. During the months when the above flights were made, there were 114 solar flares (of magnitude M2 or greater), 10 were coincident with recorded flight data. Several large magnetic solar flares peaked during aircraft data recording; however, no effects were discernible on observed signal-to-noise ratio values. This report is the third in a series of periodic technical

reports which provide a standardized data presentation of Omega signal coverage, as measured by production airborne-Omega navigation systems over routes of commercial interest under various signal environments (e.g., propagation problem regions, high solar activity). If an independent onboard position reference system was available and recorded, then Omega position differences are also presented. GRA

N84-10047# Naval Postgraduate School, Monterey, Calif. Dept. of Administrative Science.

A CRITIQUE OF NAVSTAR GLOBAL POSITIONING SYSTEM, USER EQUIPMENT, CONFIGURATION CONTROL FOR DOD COMMON AND NAVY UNIQUE ITEMS M.S. Thesis

T. D. ABRAHAMSON and G. M. MAUER, JR. Jun 1983 102 p refs

(AD-A131234) Avail: NTIS HC A06/MF A01 CSCL 17G

The User Equipment (UE) Global Positioning System (GPS) Configuration Control structures, procedures and information system up to March 1983 is critiqued. Our objective was to explore the existing configuration management plans in terms of documentation, with specific emphasis on the feasibility of the configuration control plans for the Navy unique and DoD common items. Our conclusion is that the GPS Configuration Control Structure is fundamentally sound. However, a major problem of integrating the various facets of configuration control management exists. To correct this deficiency, the GPS Program must now obtain interservice and intraservice written agreements of Configuration Control Responsibility to further specify and clarify each service's configuration control boundaries. Author (GRA)

N84-10048# Federal Aviation Agency, Washington, D.C. Office of Management Systems.

THE FAA (FEDERAL AVIATION ADMINISTRATION) AIR TRAFFIC ACTIVITY, FISCAL YEAR 1982

N. TREMBLEY 30 Sep. 1982 222 p refs

(PB83-228460) Avail: NTIS HC A10/MF A01 CSCL 17G

This report furnishes terminal and enroute air traffic activity information of the National Airspace System. The data have been reported by the FAA-operated Airport Traffic Control Towers (ARCTs), Flight Service Stations (FSSs), Combined Station Towers (CS/Ts), International Flight Service Stations (IFSSs), and Approach Control Facilities. Author (GRA)

N84-11102*# Ohio Univ., Athens. Center for Avionics Engineering

RF FRONT END INTERFACE AND AGC MODIFICATION

S. R. YOST /in NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 23-32 Oct 1983 refs

Avail: NTIS HC A07/MF A01 CSCL 17G

Preliminary results indicate that the new front end automatic gain control (AGC) combination perform satisfactorily. Side by side bench tests with Trimble 10A and Texas Instruments 9900 LORAN-C receivers have proven that the proper time differences are being obtained. Further optimization of the AGC circuit will occur as software to track all of the stations in a LORAN-C chain is developed. The AGC circuit was designed to sample up to six separate LORAN-C stations. Along with expanded station tracking software, a more sophisticated search routine is also under development. A printed circuit board for the AGC is planned and will be enclosed with the RF front end in a sealed enclosure to reduce interference from the other digital circuits of the microcomputer.

N84-11103*# Ohio Univ., Athens. Center for Avionics Engineering.

PRELIMINARY DESCRIPTION OF THE AREA NAVIGATION SOFTWARE FOR A MICROCOMPUTER-BASED LORAN-C RECEIVER

F. OGURI /in NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 33-43 Oct. 1983 refs

Avail: NTIS HC A07/MF A01 CSCL 17G

The development of new software implementation of this software on a microcomputer (MOS 6502) to provide high quality

navigation information is described. This software development provides Area/Route Navigation (RNAV) information from Time Differences (TDs) in raw form using an elliptical Earth model and a spherical model. The software is prepared for the microcomputer based Loran-C receiver. To compute navigation information, a (MOS 6502) microcomputer and a mathematical chip (AM 9511A) were combined with the Loran-C receiver. Final data reveals that this software does indeed provide accurate information with reasonable execution times. Author

N84-11107*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.

RELATIVE-DATUM LORAN NAVIGATION

A. ELIAS /in NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 99-105 Oct. 1983

Avail: NTIS HC A07/MF A01 CSCL 17G

For short range navigation around an airport, there are operational and computational advantages in changing the reference frame for Loran navigation of the normal latitude-longitude frame to a tangential local reference plane. This is called "Relative Datum Loran Navigation" since it is centered at a selected reference point (such as a runway touchdown point) whose time differences (TD's) in a given Loran grid accurately surveyed. If the receiver TD's are related to this datum to produce a relative TD (delta TD), the computation of its position in the x,y local reference plane can be computed easily using two linked linear equations which have four known constant coefficients. The TD's of all touchdown points and these four coefficients in order to provide x,y in local reference planes related to each runway can be stored. Author

N84-11109*# Princeton Univ., N. J. Lab. for Flight Research. **COCKPIT VOICE RECOGNITION PROGRAM AT PRINCETON UNIVERSITY**

C. Y. HUANG /in NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 117-132 Oct. 1983 refs

Avail: NTIS HC A07/MF A01 CSCL 17G

Voice recognition technology (VRT) is applied to aeronautics, particularly on the pilot workload alleviation. The VRT does not have to prove its maturity any longer. The feasibility of voice tuning of radio and DME are demonstrated since there are immediate advantages to the pilot and can be completed in a reasonable time. Author

N84-11110*# Princeton Univ., N. J. Lab. for Flight Research. **DISTRIBUTED PROCESSING AND FIBER OPTIC COMMUNICATIONS IN AIR DATA MEASUREMENTS**

K. A. FARRY and R. F. STENGEL /in NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 133-139 Oct. 1983 refs Previously announced as 83A-11258 (Contract NGL-31-001-252; N00014-78-C-0257)

Avail: NTIS HC A07/MF A01 CSCL 17G

The application of distributed processing, fiber optics, and hardware redundancy to collecting airstream data in Princeton's digitally controlled Variable-Response Research Aircraft (VRA) is described. Microprocessor controlled instrumentation packages in each wingtip of the aircraft collect angle of attack and sideslip data in digital form; after scaling, filtering, and calibrating the data, they send it to the aircraft's microprocessor Digital Flight Control System (micro-DFCS) via digital fiber optic data links. Each wingtip's package is independent of the other; therefore, the system has dual hardware redundancy. The fiber optic link design is presented as well as a description of the calibration and communications software. Author

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

N84-11156*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

FINDS: A FAULT INFERRING NONLINEAR DETECTION SYSTEM. USER'S GUIDE

R. E. LANCRAFT and A. K. CAGLAYAN Hampton, Va. NASA. Langley Research Center Sep. 1983 105 p refs (Contract NAS1-16579)

(NASA-CR-172199; NAS 1.26:172199; BBN-5358) Avail: NTIS HC A06/MF A01 CSCL 17G

The computer program FINDS is written in FORTRAN-77, and is intended for operation on a VAX 11-780 or 11-750 super minicomputer, using the VMS operating system. The program detects, isolates, and compensates for failures in navigation aid instruments and onboard flight control and navigation sensors of a Terminal Configured Vehicle aircraft in a Microwave Landing System environment. In addition, FINDS provides sensor fault tolerant estimates for the aircraft states which are then used by an automatic guidance and control system to land the aircraft along a prescribed path. FINDS monitors for failures by evaluating all sensor outputs simultaneously using the nonlinear analytic relationships between the various sensor outputs arising from the aircraft point mass equations of motion. Hence, FINDS is an integrated sensor failure detection and isolation system. S.L.

N84-11157*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

FLIGHT TEST RESULTS OF THE STRAPDOWN RING LASER GYRO TETRAD INERTIAL NAVIGATION SYSTEM

R. A. CARESTIA (Univ. of Southern Colorado, Pueblo), R. J. HRUBY, and W. S. BJORKMAN (Analytical Mechanics Associates, Mountain View, Calif.) Oct. 1983 74 p refs

(NASA-TM-84358; A-9315; NAS 1.15 84358) Avail: NTIS HC A04/MF A01 CSCL 17G

A helicopter flight test program undertaken to evaluate the performance of Tetrad (a strap down, laser gyro, inertial navigation system) is described. The results of 34 flights show a mean final navigational velocity error of 5.06 knots, with a standard deviation of 3.84 knots; a corresponding mean final position error of 2.66 n. mi., with a standard deviation of 1.48 n. mi.; and a modeled mean position error growth rate for the 34 tests of 1.96 knots, with a standard deviation of 1.09 knots. No laser gyro or accelerometer failures were detected during the flight tests. Off line parity residual studies used simulated failures with the prerecorded flight test and laboratory test data. The airborne Tetrad system's failure-detection logic, exercised during the tests, successfully demonstrated the detection of simulated "hard" failures and the system's ability to continue successfully to navigate by removing the simulated faulted sensor from the computations. Tetrad's four ring laser gyros provided reliable and accurate angular rate sensing during the 4 yr of the test program, and no sensor failures were detected during the evaluation of free inertial navigation performance. Author

N84-11158# Mitre Corp., McLean, Va.

PERFORMANCE OF THE COLLISION AVOIDANCE LOGIC DURING PRELIMINARY FLIGHT TESTS OF THE TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS 3) Final Report

L. B. ZARRELLI Washington FAA Mar. 1983 77 p refs (Contract DTFA01-82-C-10003)

(MTR-82W238; FAA-PM-83-27) Avail: NTIS HC A05/MF A01

Flight tests of a prototype Traffic Alert and Collision Avoidance System (TCAS II) were conducted by the FAA Technical Center between August and October 1981. One purpose of the flight tests was to verify the effectiveness of the TCAS logic in generating safe separation. Eighty-three planned encounters were flown during the test program. In addition, 14 low approaches, which resulted in the display of seven resolution advisories, were made into Washington National and Chicago O'Hare Airports. Three encounters of opportunity were also recorded. A total of 93 encounters were analyzed. The primary characteristics used to measure TCAS performance included the timeliness and correctness of the traffic and resolution advisories, and, where

appropriate, the vertical separation provided by the system. The advisories generated during the flight tests were timely and were in the correct direction, based on the data at the time of sense selection. The vertical separation achieved at closest approach for each encounter was analyzed by a fast-time replay capability. With nine exceptions, this vertical separation was greater than or equal to the system threshold. In three of the exceptions, separation was reduced due to significant pilot delay in responding to the advisory; however the TCAS logic performed properly. Author

N84-11159# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).

INFLUENCE OF PHYSICAL AND AIR TRAFFIC CONDITIONS ON AIRCRAFT NOISE EMISSION TO THE GROUND Thesis [EINFLUSS DER PHYSIKALISCHEN UND FLUGBETRIEBLICHEN BEDINGUNGEN AUF DIE FLUGLAERMIMMISSION AM BODEN] U. ISSERMANN Oct 1982 111 p refs In GERMAN (MPIS-11/1982; ISSN-0436-1199) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19.65

The dependence of form and size of aircraft noise zones on the physical and air traffic conditions was investigated. The acoustic quantities required to determine the equivalent noise level are explained. A method to calculate the noise level curves is presented. The form of the noise spectrum has a strong effect on the damping of the waves in the atmosphere. The most important damping mechanisms are absorption in the air and additional damping in the neighborhood of the ground. The first mechanism is accurately taken into account by the method. Different models are used to take the second mechanism into account in the calculation. Observations show that the flight paths have considerable side scattering, resulting in a flight corridor several km broad. Author (ESA)

05

AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

A84-10565#

AERODYNAMICAL DESIGN CONSIDERATIONS FOR FUTURE SUPERSONIC AIRCRAFT - ADVANTAGES AND LIMITATIONS OF THE UNSTABLE DESIGN OF MILITARY AIRCRAFT [AERODYNAMISCHE AUSLEGUNGSUEBERLEGUNGEN FUER ZUKUNFTIGE UEBERSCHALLFLUGZEUGE - VORTEILE UND GRENZEN EINER INSTABILEN AUSLEGUNG VON KAMPFFLUGZEUGEN]

G. WEDEKIND (Dornier GmbH, Friedrichshafen, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov. 11, 12, 1982, Paper. 17 p. In German.

The destabilization of stable wing designs, or the design of unstable wings, for the purpose of increasing the supersonic turn rate of a fighter aircraft is discussed from a theoretical standpoint. It is shown that destabilization can produce significant improvements in the subsonic and supersonic performance of existing wings, and that unstable supersonic wing designs are superior to stable designs. In designing new purely subsonic wings, however, the effort of creating an unstable design is probably unnecessary. Drawings and diagrams illustrate these findings.

T.K.

A84-10569#

PROBLEMS REGARDING FLIGHT CHARACTERISTICS IN CONNECTION WITH A PERFORMANCE-OPTIMUM DESIGN OF FUTURE COMBAT AIRCRAFT [FLUGEIGENSCHAFTSPROBLEME BEI LEISTUNGSOPTIMALER AUSLEGUNG ZUKUNFTIGER KAMPFFLUGZEUGE]

P. MANGOLD (Dornier GmbH, Friedrichshafen, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov. 11, 12, 1982. 39 p. In German. refs (DGLR PAPER 82-097)

As a result of the extraordinarily high demands which future combat aircraft are supposed to satisfy for all flight conditions, partly very contradictory requirements arise. It has been recognized that these requirements can be satisfied by a design which leads in the subsonic range to a more or less unstable aircraft configuration with respect to the longitudinal motion. The implementation of such a design, in combination with the introduction of new maneuver modes and the employment of high angles of attack, makes it necessary to satisfy extreme demands concerning the flight control system. A description is given of two guiding principles which make it possible to reduce the expenditures for the required control system. Studies related to the utilization of these principles are discussed. Attention is given to the effect of configuration components on the characteristic parameters of lateral motion and on the stationary longitudinal motion properties, the dynamic behavior in the longitudinal motion properties, the dynamic behavior in the longitudinal motion, and the results of the studies. G.R.

A84-10570#

THE PERFORMANCE OF A SUBSONIC COMBAT AIRCRAFT WITH TRANSONIC WING AND MANEUVER FLAPS [LEISTUNGEN EINES UNTERSCHALL-KAMPFFLUGZEUGES MIT TRANSSONISCHEM TRAGFLUEGEL UND MANOEVERKLAPPEN]

D. JACOB and R. MATECKI (Dornier GmbH, Friedrichshafen, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov. 11, 12, 1982. 17 p. In German. Research supported by the Bundesministerium der Verteidigung. refs (DGLR PAPER 82-101)

A transonic wing with maneuver flaps was developed for the Alpha-Jet and subjected to a flight test. The present investigation provides a survey regarding the development program, taking into account essential results which demonstrate the improvement in performance which can be obtained with a transonic wing. Design details concerning the transonic wing are discussed along with the advantages of such a wing in comparison to a wing with conventional design characteristics. In connection with the flight tests, 110 flights were performed by five pilots for the testing of five different configurations. The data determined during the flight regarding the pressure distribution agree with the theoretical results provided by a solution of the three-dimensional potential equation. Attention is also given to details of flight performance and flight characteristics. G.R.

A84-10573*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.

AD-1 OBLIQUE WING RESEARCH AIRCRAFT PILOT EVALUATION PROGRAM

W. D. PAINTER (NASA, Flight Research Center, Edwards, CA) American Institute of Aeronautics and Astronautics, Aircraft Design, Systems and Technology Meeting, Fort Worth, TX, Oct. 17-19, 1983. 18 p (AIAA PAPER 83-2509)

A flight test program of a low cost, low speed, manned, oblique wing research airplane was conducted at the NASA Dryden Flight Research Facility in cooperation with NASA Ames Research Center between 1979 and 1982. When the principal purpose of the test program was completed, which was to demonstrate the flight and handling characteristics of the configuration, particularly in

wing-sweep-angle ranges from 45 to 60 deg, a pilot evaluation program was conducted to obtain a qualification evaluation of the flying qualities of an oblique wing aircraft. These results were documented for use in future studies of such aircraft. Author

A84-10709

EJECTION AT 700 KEAS - THE SAAB JA-37 VIGGEN EJECTION SEAT TESTS AT HOLLoman AIR FORCE BASE

C. D. GRAGG (USAF, Holloman AFB, NM) and H. J. T. MENNBORG (SAAB-Scania AB, Linkoping, Sweden) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 22-26. refs

The considered program consisted of a series of five, single-seat ejection system tests. The tests involved the use of a high speed test track and the employment of the general escape system testing techniques described by Gragg and Coulter (1979). It is pointed out that the escape system ejection would have resulted in the escape of the pilot from the aircraft at all velocities tested. After seat/man separation, the seat drogue chute was an effective deterrent to interference at these velocities. The primary objective of the test program was to verify the function and performance of the escape system at high velocities. G.R.

A84-10715

DEVELOPMENT OF A CONTINUOUS MODE SEQUENCING CONCEPT FOR EJECTION SEATS

L. A. DAULERIO (U.S. Naval Material Command, Naval Air Development Center, Warminster, PA) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 50-52

An ejection seat event sequencing concept for activating and deploying seat subsystems after analyses of airspeed and altitude during ejection is described. A study involving linear least squares fitting to establish the parachute pack opening time at various airspeeds for different seats provided a data base for the control of parachute deployment times after ejection. It was found that quicker deployment times could be achieved for low altitude, low velocity ejections, while seat deceleration delays were needed to assure safe parachute deployment at high velocities. Microprocessor technology was judged advanced enough to correctly evaluate ejection trajectories at low and high altitudes, and low and high velocity ejections. D.H.K.

A84-10723

THE RANGER SYSTEM, A NEW WAY OUT

T. STONE (Stencel Aero Engineering Corp., Arden, NC) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 122-125

The Ranger aircraft escape system is described, together with features of its predecessor, the Yankee tractor rocket aircrew escape system. The Yankee provided crew escape by means of a rocket attached to the crewmember by a long, elastic cable. The seat back rose high enough to provide guidance at launch, which was soft. The system is used on the A300 Airbus and the Lear Fan. The Ranger system extends Yankee capabilities to zero altitude and zero airspeed. It comprises a rocket and launcher, a pendant disconnect assembly, a lap belt, a parachute and harness assembly, and an initiation subsystem. A spring-loaded pilot chute is deployed just before rocket separation. A reliability rate of 92.8 percent has been demonstrated during 83 tests of the system. D.H.K.

A84-10724

THE S4S EJECTION SEAT - A PROGRESS REPORT

W. L. TRAYNOR (Stencel Aero Engineering Corp., Arden, NC) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 126-129.

The design objectives and preliminary test results with the S4S ejection seat are described. The S4S is intended to incorporate composite materials and microprocessor technology, deployable

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stabilization fins, employ the fast-opening AIM parachute, and simplicity of design. Thin layer explosive lines were selected as the transfer media for ballistic signals. Tests have been run at 0, 200, 450, and 600 kn airspeed, demonstrating that stabilization and continuously sensed airspeed has been achieved. Further development is projected, however, in the low-speed flight regime. M.S.K.

A84-10727 DEVELOPMENT OF THE MARTIN-BAKER MK 12 HIGH TECHNOLOGY ESCAPE SYSTEM

B. A. MILLER (Martin-Baker Aircraft Co., Ltd., Higher Denham, Middx., England) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 141-145.

The MK 12 ejection seat escape system for fighter aircraft, which has been selected by the RAF for its AV-8B, is essentially a refinement of the MK 10 ejection seat design which extends capabilities for sensing airspeed and adjusting operational mode in the low speed/adverse attitude ejection conditions typical of V/STOL aircraft. The MK 12 system incorporates among its improved features a high energy drogue gun, a quick acting drogue deployment system, an automatic inflation modulation parachute, and both electrical and mechanical pressure-based speed sensors. O.C.

A84-10889# COMPOSITES/COMPUTER COMBO SPAWNS JUMBO FUEL SPONSONS

V. WIGOTSKY (Astronautics and Aeronautics (ISSN 0004-6213), vol. 21, Nov. 1983, p. 26-28.

The MH-53E Super Stallion minesweeping helicopter incorporates two fuel sponsons which represent one of the largest existing applications of advanced composite structural components to aircraft. The sponsons' skins are of graphite/epoxy with Nomex honeycomb cores, and are 15 percent lighter than the alternative structure composed of aluminum sheet, extrusions, and aluminum honeycomb panels faced with fiberglass. The computer-aided interactive design system employed led to an 80 percent reduction in design development time, by comparison to manual computation and conventional engineering drawing procedures. Attention is given to the structural details of the sponsons and the molding and curing procedures employed during their manufacture. O.C.

A84-11037# OPTIMAL FREQUENCY RESPONSE MODIFICATION BY ADDED PASSIVE STRUCTURES

L. KITIS (Worcester Polytechnic Institute, Worcester, MA), W. D. PILKEY, and B. P. WANG (Virginia, University, Charlottesville, VA) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 897, 898. Army-supported research. refs

Two frequency response optimization methods for vibrating structures are developed for appending absorbers to the system. The methods are suitable for discrete models with a large number of degrees of freedom and are applied to obtain optimal broadband response. Reanalysis and modal synthesis techniques are used in the structural dynamic analysis phase of the design algorithm and optimization is carried out by a feasible directions approach. These optimal design algorithms have been applied to a 39 degree-of-freedom helicopter model with discrete conventional absorbers and beam absorbers. Author

A84-11040*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EXPERIENCES IN THE USE OF COMPOSITE MATERIAL FOR A WING SKIN

C. V. ECKSTROM (NASA, Langley Research Center, Loads and Aeroelasticity Div., Hampton, VA) and C. V. SPAIN (Kenton Technical Center, Hampton, VA) (Structures, Structural Dynamics and Materials Conference, 23rd, New Orleans, LA, May 10-12, 1982, Collection of Technical Papers. Part 2, p. 157-165) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 913-919. refs

Previously cited in issue 13, p. 2021, Accession no. A82-30146

A84-11041# PRESSURE MEASUREMENTS ON TWIN VERTICAL TAILS IN BUFFETING FLOW

W. E. TRIPLET (McDonnell Aircraft Co., St. Louis, MO) (Structures, Structural Dynamics and Materials Conference, 23rd, New Orleans, LA, May 10-12, 1982, Collection of Technical Papers. Part 2, p. 77-83) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 920-925. USAF-sponsored research.

Previously cited in issue 13, p. 2021, Accession no. A82-30138

A84-11047# ANALYSIS OF AN AIRPLANE WINDSHIELD ANTI-ICING SYSTEM USING HOT AIR

R. ROSS (Ross Aviation Associates, Sedgwick, KS) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 963-967.

Previously cited in issue 19, p. 2977, Accession no. A82-39134

A84-11050*# Stanford Univ., Calif. A FUNDAMENTAL COMPARISON OF CANARD AND CONVENTIONAL CONFIGURATIONS

T. MCGEER (Stanford University, Stanford, CA) and I. KROO (NASA, Ames Research Center, Moffett Field; Stanford University, Stanford, CA) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 983-992. refs

This paper examines the relative efficiency of canard, tandem, and aft-tailed aircraft configurations through analysis of an elementary lifting system. Stability and trim requirements are imposed upon the system and its $C_{sub L(max)}$, drag, and structural weight are studied as its geometry varies over a wide range of possible configurations. During the course of the analysis, two general solutions emerge for minimum induced drag as a function of the geometry and the division of lift between the surfaces of such a system - one for fixed span and the other for fixed weight. The conclusion is that the pre-eminence of the conventional aft-tailed configuration has a sound fundamental basis, but that there may be some room for improvement. Author

A84-11056# FIBER COMPOSITE STRUCTURES FOR MILITARY HELICOPTERS [FAVERBUNDSTRUKTUREN FUER MILITAERISCHE HUBSCHRAUBER]

K. BRUNSCH (Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 1. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 18 p. In German.

The utilization of fiber composite materials in the design of helicopter structures leads to an improved effectiveness. The reasons for such an improvement are discussed. Fiber composite materials are employed in almost all rotor blade designs developed during the last few years. The reason for this selection of fiber composite materials is related to the favorable mechanical properties of these materials and to the possibility to eliminate corrosion problems. The contributions made to this development by a German aerospace company are examined, taking into account the invention of a novel hingeless rotor system based on the use of glass fiber reinforced plastics. Attention is also given to the

development of bearingless rotors using fiber reinforced composites, the development of a fiber composite shaft system for a helicopter tail rotor, and the advantages of glass fiber reinforced composites in comparison to aluminum or titanium alloys. G.R.

A84-11064#

BK-117 - A GERMAN-JAPANESE HELICOPTER FOR THE WORLD MARKET [BK 117 - EIN DEUTSCH-JAPANISCHER HUBSCHRAUBER FÜR DEN WELTMARKT]

D. HALFF and H. SCHMIDT-BISCHOFFSHAUSEN (Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 20 p. In German.

The development of the BK-117 multipurpose 8-11-seat helicopter is discussed. The market analysis, financial negotiations, division of tasks, and development program leading to the BK-117 are reviewed. The final specifications of the BK-117, which is basically an enlarged version of the BO-105, include cargo space = 1.7 cu m, empty weight of the standard version = 1625 kg, normal load = 1225 kg, maximum load = 1375 kg, normal fuel capacity = 480 kg, fuel capacity with two extra tanks = 800 kg, cruising speed = 257 km/h, climbing speed = 9.3 m/sec, maximum operating altitude = 5180 m, and range with maximum load and standard fuel capacity (no reserve) = 545 km. Deployment of the BK-117 as a utility, business, offshore, SAR, police, or ambulance helicopter is foreseen. T.K.

A84-11066#

A FULLY AUTOMATIC, TEMPERATURE-REGULATED ANTI-ICE DEVICE FOR ROTOR BLADES AND ENGINE INTAKES [VOLLAUTOMATISCHER, TEMPERATURGEREGELTER VEREISUNGSSCHUTZ FÜR ROTORBLÄTTER UND TRIEBWERKSEINLAUFE]

A. STRAUPE (Telefunken AG, Wedel, West Germany) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 14 p. In German.

A cyclic-deicing system for helicopter rotor blades (and applicable to engine intakes) is characterized. The device is based on an advanced heating mesh (thickness 0.6 mm or more, weight about 1 kp/sq m, output up to 8 W/sq cm, temperature-stable up to 453 K) controlled by using the resistance of the mesh itself as the temperature sensor. The 13.5-kW, 5-kp microprocessor power-control unit containing the temperature-regulation circuits and a binary-output built-in-test function feeds the rotor meshes alternately via a low-resistance (about 1-mohm) slip-ring power distributor. Cockpit controls allow for manual or automatic operation and for self-testing. Economic operation is achieved through the precise control of heating, the conductive structure of the mesh, and the reduced weights of the power-control and power-distributor units. T.K.

A84-11068#

THE MODERN WEAPON SYSTEMS BO 105M AND BO 105P [MODERNE WAFFENSYSTEME BO 105M UND BO 105P]

A. HORLEBEIN and W. KUCKEIN (Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 26 p. In German.

The modification of the standard BO-105 helicopter for military applications as a communication and reconnaissance helicopter (BO-105M, also called VBH) or as an antitank helicopter carrying 6 HOT missiles (BO-105P, or PAH-1) is characterized and illustrated. The history of development and deployment is traced, and the need to compromise some of the performance goals to achieve deployment by 1979 is indicated. Consideration is given to the structural and functional modifications, the effects of the 2400-kg weight limitation, the establishment of a functioning support

system, cost control, and the initial phase of deployment. Programs are underway to incorporate image-enhancing glasses and Stinger missiles into the BO-105M, to add a warning radar system and a hit/have-been-hit indicator (for tank-helicopter-duel exercises) to the BO-105P, and to improve the flight duration of the BO-105P (presently 1 h 35 min + 20 min reserve) by reducing the weight. T.K.

A84-11070#

AIR MOBILITY AND THE AGUSTA A-129 'MONGOOSE'

G. BOLOGNA, A. GIOVANNINI, and D. H. MONEY (Costruzioni Aeronautiche Giovanni Agusta S.p.A., Gallarate, Italy) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 34 p.

The A-129 Mongoose 3655-kg twin-engine, 4-blade, two-crew-member light attack and scout helicopter developed for the Italian army is characterized, with an emphasis on performance features increasing survivability in combat situations. Features discussed include small size and radar signature, agility, redundancy, ballistic tolerance, crew placement, crashworthiness, electronic defense systems, flight controls, rotor systems, power plant, and environmental control. The results of performance tests to Italian Army specifications and by the US Army are presented in tables and examined. The A-129 is found to have limited capabilities in night-attack and combat against fortified positions, but to be very effective in most other typical NATO scenarios. Numerous drawings and photographs are provided. T.K.

A84-11172

AIRCRAFT THAT FLY BACKWARDS? - THE APPLICATION OF FORWARD SWEEP WINGS

D. HOWE (Cranfield Institute of Technology, Cranfield, Beds., England) Aeronautical Journal (ISSN 0001-9240), vol. 87, Oct. 1983, p. 321-323 refs

When a canard is associated with a sweptforward wing, such as those of the Pegasus-powered V/STOL fighters presently considered, the canard downwash is such as to compensate for the root stall problems inherent in a sweptforward wing's spanwise flow characteristics. Several configurational alternatives are examined which incorporate either a plenum chamber burning version of the Harrier fighter's Pegasus engine, or Aden vectorable nozzles. Upon comparison with the characteristics of conventional sweptback wing configurations, it is found that the sweptforward configurations exhibit transonic area distribution improvements. O.C.

A84-11272

APPLICATION OF OPTIMIZATION METHODS TO ROTOR DESIGN PROBLEMS

R. L. BENNETT (Bell Helicopter Textron, Fort Worth, TX) Vertica (ISSN 0360-5450), vol. 7, no. 3, 1983, p. 201-208. refs

Closed loop, design oriented analytical models have been produced by combining conventional helicopter engineering analyses with a Nonlinear Programming (NLP) Algorithm. The resulting models are shown to be very effective in supporting detailed design by eliminating the existing external man-in-the-loop iterative process. Described in this paper are: nonlinear programming problem and how it relates to the engineering design process; and typical NLP algorithms and how they are combined with conventional engineering analyses. Four different engineering design problems are solved using the resulting optimal design techniques. Author

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A84-12111

PROBLEMS OF INVARIANCE AND STABILITY IN THE DYNAMICS OF STRATOSPHERIC OBSERVATORIES [ZADACHI INVARIANTNOSTI I USTOICHIVOSTI V DINAMIKE STRATOSFERNYKH OBSERVATORII]

L. Z. DULKIN, A. S. ZEMLIAKOV, A. I. KARPOV, V. M. MATROSOV, and V. A. STREZHNEV IN: The method of Liapunov functions in the dynamics of nonlinear systems. Novosibirsk, Izdatel'stvo Nauka, 1983, p. 157-178. In Russian. refs

The investigation of the invariance and stability of stratospheric solar observatories on the basis of Liapunov vector functions and frequency methods is discussed. A method is proposed for synthesizing control systems on the basis of invariance and stability principles in the form of an iterative process. Results pertaining to the stabilization of the telescope of a balloon-borne observatory are presented. B.J.

A84-12302#

TOMAHAWK TEST PROGRAM

H. R. AUTEN (General Dynamics Corp., Convair Div., San Diego, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p. (AIAA PAPER 83-2683)

The paper reviews the Tomahawk cruise missile flight test program from the early study phases to initial testing and through initial operational test and evaluation of the Ground Launched Cruise Missile. Variants of the Tomahawk are briefly discussed. The interaction of government ranges, facilities, and equipment with the prime contractor are reviewed. Factors concerning test mission completion, data acquisition, flight safety, missile recovery, and refurbishment for further test use are discussed. Overall flight test results, to date, are presented. Author

A84-12303#

TESTING TO USER'S REQUIREMENTS - AMRAAM IOT&E

T. G. WHEELER (USAF, Operational Test and Evaluation Center, Kirtland AFB, NM) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p. (AIAA PAPER 83-2684)

The present investigation is concerned with the initial operational test and evaluation (IOT and E) of the Advanced Medium Range Air-to-Air Missile (AMRAAM) designated the AIM-120A. The Air Force Operational Test and Evaluation Center (AFOTEC) will conduct this IOT and E using preproduction missiles during the full scale development phase of the acquisition program. Background information concerning the AIM-120A is considered along with user needs, system characteristics, aspects of test management, details regarding the test objectives, and questions related to range capability considerations and test locations. Attention is given to test information sources, test plan and method, data collection/media, requirements of data measurement, aspects of data processing and analysis, the importance of accurate reporting, and the 'lessons learned' report. G.R.

A84-12306#

IN-FLIGHT SHORT FIELD LANDING INVESTIGATIONS ON A COMBAT AIRCRAFT WITH THRUST REVERSER

K. H. BURGER (Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 6 p. (AIAA PAPER 83-2693)

Flight test results, theoretical considerations, and the role of a thrust reverser in the short field landing procedures for the Tornado military fighter aircraft are discussed. A normal landing profile covering aerodynamic data, ground effects, analytical calculations, simulator data, and safety was developed prior to the tests. The landing included a steep approach and flare delay, with deployment of deceleration devices as quickly as possible. Studies indicated that full reverse thrust and full brakes could be used effectively with full manual control over thrust reversal. A high pilot workload was encountered in the STOL trials due to the narrow sequence

of prescribed actions, while the necessary landing distance needed was halved. M.S.K.

A84-12317#

WINNING THE T-46A PROGRAM THROUGH FLIGHT TEST

W. H. SHAWLER (Fairchild Republic Co., Farmingdale, NY) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p. (AIAA PAPER 83-2713)

Steps taken to win the contract and subsequent joint flight tests of the T-46 trainer are described. Before the proposal was submitted 1200 hr of wind tunnel tests were performed, a scale model was flown 45 times, a full-scale engineering mock-up was constructed, as was a cockpit, and a 62 percent size manned demonstrator with mechanical controls was built and flown. After the contract was signed, five models were procured for design improvements, aerodynamics were verified in wind tunnel trials, 1/8, 1/6, and 1/18 scale models were put through spin tests, and a 1/4 model was used to examine flutter characteristics. Two production aircraft were permitted for flight tests, and complete testing is scheduled to be completed within a 20 mo period, with 80 percent of the envelope explored in the first 3 mos. All interested Air Force offices will be using data from flights of the two aircraft. M.S.K.

A84-12324#

F-16XL FLIGHT TEST PROGRAM OVERVIEW

H. J. HILLAKER (General Dynamics Corp., Fort Worth, TX) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 7 p. (AIAA PAPER 83-2730)

Two F-16 aircraft were modified into F-16XL flight demonstrator aircraft to validate the aerodynamic and operational benefits of a cranked-arrow type wing planform. The objectives of the flight test program were (1) to provide data to the Air Force Aeronautical Systems Command's Derivative Fighter Comparative Evaluation and (2) to demonstrate that the configuration changes to the F-16, when fully developed, would achieve a major improvement in operational effectiveness/suitability in both the air-to-surface and air-to-air role. The test program was structured to validate, or assess, aircraft performance, flying qualities, system performance, operational factors, mission profiles and reliability and maintainability factors. The flight test program was conducted at Edwards' AFB, California by a dedicated team within the F-16 Combined Test Force. This team was made up of pilots from the Air Force's Flight Test Center, the Operational Test and Evaluation Center, Tactical Air Command, and from General Dynamics. Author

A84-12328#

FLIGHT TEST TECHNIQUE FOR THE ASSESSMENT OF HELICOPTER MISSION DEMANDS

H.-J. PAUSDER, H. MEYER, K. SANDERS, and G. WULFF (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Flugmechanik, Brunswick, West Germany) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 9 p. refs (AIAA PAPER 83-2735)

The intention of the paper is to present a flight test technique for the evaluation of helicopter flight dynamics. Emphasis is placed on the discussion of the whole flight test loop including flight task definition, test procedure, the role of the test pilot, data acquisition, and data analysis. The technique is illustrated by tests for the assessment of mission demands. The test mission was combined from maneuvers which are representative of NOE-flight profiles. In addition results which specify the required agility of helicopters in NOE-maneuvering are outlined. Author

A84-12331#

THE CHALLENGES OF MANEUVERING FLIGHT PERFORMANCE TESTING IN MODERN ROTARY WING AIRCRAFT

C. A. PARLIER (Hughes Helicopters, Inc., Mesa, AZ) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 10 p (AIAA PAPER 83-2739)

The present investigation is concerned with the maneuvering capability of current and future rotary wing aircraft as one of the important aspects of flight testing. For the objectives of the investigation, maneuverability is defined as the true limit performance of an aircraft. Background developments related to increased needs for greater maneuverability in helicopters are examined, taking into account the first general use of helicopters to perform ground attack missions in the mid-sixties, and the advent of potential air-to-air weaponry on the Mi-24E Hind. Attention is given to evasive maneuvering (EVM), needs for greater maneuverability in connection with low level terrain flight, specification limitations, rotary wing maneuvering flight shortcomings, and proposed improvements G.R.

A84-12333#

A PROCEDURE FOR DETERMINING FLIGHT PATH WIND COMPONENT DURING TAKEOFF AND LANDING TESTS

H. K. CHENEY (Douglas Aircraft Co., Long Beach, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p. (AIAA PAPER 83-2741)

A procedure is presented for calculating the instantaneous flight path wind component at the aircraft as it traveled through the air mass during a takeoff or landing test. The primary test measurement to obtain the wind component is pitot total pressure. The results demonstrate the problems involved in obtaining accurate wind values for performance testing. The wind component is determined by subtracting ground speed, which is obtained from space position data, from true airspeed. True airspeed is calculated using a pitot total pressure and a pressure altitude determined using a reference altitude and space position height. The reference pressure altitude used is confirmed by requiring the indicated wind component to be the same before and after the aircraft brakes are released or the aircraft is stopped. The procedures used and typical results are presented. Author

A84-12334#

USE OF GENERAL AVIATION AIRCRAFT AS AN ADVANCED SYSTEM TEST BED

R. K. SVEC (McDonnell Douglas Astronautics Co., Saint Louis, MO) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p. (AIAA PAPER 83-2742)

Any test program has the objective to obtain the maximum amount of valid, repeatable data at the least cost. One approach to achieve this objective involves the use of a general aviation aircraft as a test bed. An American aerospace company has been conducting guidance system and advanced sensor development test flights using two twin-engine turboprop aircraft. These two aircraft represent two capable and versatile test beds which can satisfy most flight tests requirements. Systems can be tested at airspeeds in the range from 120 to 220 knots from very low altitudes to approximately 30,000 feet G.R.

A84-12335#

EVOLUTION IN FLIGHT TEST TECHNIQUES - APPLICATION AT AERITALIA

G. FERRETTI and R. CARABELLI (Aeritalia S.p.A., Gruppo Velivoli da Combattimento, Turin, Italy) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p. (AIAA PAPER 83-2744)

Upgraded data processing and flight test data acquisition techniques being implemented for the AM-X, F104S, and the Agile Combat Aircraft (ACA) flight tests are described, noting the

development of most of the methods during Tornado flight tests. Improvements included real-time data displays, buffer storage for telemetry, and distributed CRT terminals. The real-time aspect of the data displays enables flight test engineers to detect when aircraft performance approaches predicted hazardous areas of the flight envelopes. A parameter identification technique was developed for automating analysis of the aerodynamic derivatives for comparisons with predictions. Details of the distributed processing and telemetry installations at Decimo, Sardinia, and Caselle on mainland Italy are provided, together with flight test systems of the flutter excitation system on the Tornado and of the Flight Test Management System for the AM-X aircraft.

M.S.K.

A84-12337#

THE M.C.A.-METHOD, A FLIGHT TEST TECHNIQUE TO DETERMINE THRUST OF JET AIRCRAFT IN FLIGHT

R. E. ROSENBERG and G. SCHUCH (Bundesamt fuer Wehrtechnik und Beschaffung, Manching, West Germany) (Zeitschrift fuer Flugwissenschaften und Weltraumforschung, vol. 6, Nov.-Dec. 1982, p. 383-390) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 9 p. (AIAA PAPER 83-2749)

Previously cited in issue 7, p. 865, Accession no. A83-19661

A84-12338*# Mississippi State Univ., Mississippi State.

A NEW METHOD FOR FLIGHT TEST DETERMINATION OF PROPULSIVE EFFICIENCY AND DRAG COEFFICIENT

G. BULL and P. D. BRIDGES (Mississippi State University, Mississippi State, MS) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 11 p. refs

(Contract NAG1-3)

(AIAA PAPER 83-2750)

A flight test method is described from which propulsive efficiency as well as parasite and induced drag coefficients can be directly determined using relatively simple instrumentation and analysis techniques. The method uses information contained in the transient response in airspeed for a small power change in level flight in addition to the usual measurement of power required for level flight. Measurements of pitch angle and longitudinal and normal acceleration are eliminated. The theoretical basis for the method, the analytical techniques used, and the results of application of the method to flight test data are presented. Author

A84-12339#

THRUST MODELING - A SIMPLIFIED IN-FLIGHT THRUST AND AIRFLOW PREDICTION TECHNIQUE FOR FLIGHT TEST PERFORMANCE MEASUREMENTS

K. B. BRAMAN, W. G. SCHWEIKHARD, and T. R. YECHOUT (Kansas, University, Lawrence, KS) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 9 p. refs

(AIAA PAPER 83-2751)

A simplified in-flight thrust and airflow prediction technique was developed and evaluated by the University of Kansas under NASA Dryden sponsorship. The technique was demonstrated on a Learjet Model 55 aircraft with Garrett Air Research TFE-731-3A turbofan engines. The technique consisted of correcting the engine deck predictions of thrust and airflow with a theoretical correction based on the thrust momentum equation and a functional relationship of measured thrust specific fuel consumption (TSFC) to deck predicted TSFC. The results show the relationship of the corrected in-flight thrust parameters to the deck predicted values. Accuracies associated with this type of method have been estimated using influence coefficient techniques (Marshall and Schweikhard, 1973) and have been determined to be comparable with other more complex thrust determination methods. Author

A84-12340#

FLIGHT VIBRATION TEST ANALYSIS - METHODS, THEORY AND APPLICATION

K. KOENIG (Messerschmitt-Boelkow-Blohm GmbH, Bremen, West Germany) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 21 p refs (AIAA PAPER 83-2752)

This paper deals with the principles and problems of light vibration test analysis. In the following, mathematical details of a simple analysis method are given together with information about its operation. Some examples taken from Airbus flight vibration tests are presented; also, the results of 8 different analyses obtained with 8 different methods applied to one single test are compared. It is evident that even if it is possible to perform safe tests - the accuracy of the test results is rather poor. A certain percentage of scatter is to be expected for the frequencies, some 10 percent for the dampings and some 100 percent for the residues or modal deformations. This is insufficient and an effort towards improvement should be made as a certain part of the a/c capacity may be wasted. Author

A84-12341#

FLIGHT VIBRATION TESTING WITH TIP VANE ON AIRBUS A310

H. ZIMMERMANN (Messerschmitt-Boelkow-Blohm GmbH, Bremen, West Germany) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 15 p. refs (AIAA PAPER 83-2753)

Both transport and fighter aircraft must be subjected to flight vibration tests to show that the aircraft flight envelope is free of flutter. The report briefly outlines the advantages and disadvantages of the excitation methods that have been developed in the last 40 years for flight vibration testing. The main topic is the description and assessment of the wing-tip-vane excitation system that was used in the A310 flight vibration tests. With this system all relevant wing modes and also the tail modes were excited to yield good quality response data so that the data evaluation methods lead to reasonable results in the modal analysis of the A310 aircraft. For this modal analysis state-of-the-art evaluation methods were used. The results of the flight vibration modal analysis agreed well with flutter calculations based on linear aerodynamic theory corrected for transonic effects. The excitation system incorporated a self-monitoring emergency-off feature to help maintain in-flight safety. It will be expanded for future work to incorporate a flutter suppression facility. Author

A84-12342*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

IN-FLIGHT ACOUSTIC TESTING TECHNIQUES USING THE YO-3A ACOUSTIC RESEARCH AIRCRAFT

J. L. CROSS and M. E. WATTS (NASA, Ames Research Center, Moffett Field, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 9 p. refs (AIAA PAPER 83-2754)

This report discusses the flight testing techniques and equipment employed during air-to-air acoustic testing of helicopters at Ames Research Center. The in-flight measurement technique used enables acoustic data to be obtained without the limitations of anechoic chambers or the multitude of variables encountered in ground based flyover testing. The air-to-air testing is made possible by the NASA YO-3A Acoustic Research Aircraft. This 'Quiet Aircraft' is an acoustically instrumented version of a quiet observation aircraft manufactured for the military. To date, tests with the following aircraft have been conducted: YO-3A background noise; Hughes 500D; Hughes AH-64; Bell AH-1S; Bell AH-1G. Several system upgrades are being designed and implemented to improve the quality of data. This report will discuss not only the equipment involved and aircraft tested, but also the techniques used in these tests. In particular, formation flying, position locations, and the test matrices will be discussed. Examples of data taken will also be presented. Author

A84-12343#

SCIENTIFIC DATA PROCESSOR - TELEMETRY PREPROCESSING IN THE REAL-TIME FLIGHT TEST ENVIRONMENT

J. DICKHUDDT (Computer Sciences Corp., Lompoc, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 7 p. (AIAA PAPER 83-2755)

As the sophistication of on-board avionics has increased in recent years, so has the volume of downlink data which contemporary telemetry systems must acquire and process. In the face of this mounting burden the concept of preprocessing continues to gain popularity. This paper discusses the recognized merits of telemetry preprocessing, and presents a system implementation which addresses data ingest (merging and time tagging), Engineering Units (EU) conversion (polynomial expansion and table look-up), data editing (filtering and compression), and data sorting (process, history and display buffers), as well as direct output to strip chart and printer/plotter recorders at rates over 300K measurements/second. Author

A84-12349#

STRUCTURAL FLIGHT LOAD TESTING PRE AND POST FLIGHT ANALYSIS

E. RAUSCHER (Messerschmitt-Boelkow-Blohm GmbH, Toulouse, France) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 10 p. refs (AIAA PAPER 83-2763)

In this paper structural flight load testing is reported. Procedures given as an example here were used for flight testing and others on the Airbus A 310 and are applied to the A 300-600, actually flying now. It is described to obtain flight loads from calibration methods including strain gauge bridge selections. There are several evaluation methods for short and long flight periods to check design loads for static and fatigue criteria. The Maximum Likelihood method is used to investigate aerodynamic coefficients. Counting procedures are used for statistical purposes. Author

A84-12355#

TESTING OF THE SAAB-FAIRCHILD 340

O. KLINDER (Saab-Scania AB, Linköping, Sweden) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 9 p. (AIAA PAPER 83-2775)

The jointly developed Swedish-American commuter-aircraft SF 340 is briefly reviewed, especially what is new in the design. An overview of the test program is given. The test organization is reviewed, together with the approach to the test concept, with emphasis on the utilization of test rigs and a development simulator in conjunction with the preparation of a detailed flight test plan. The designation of test aircraft to different objectives is described as well as special equipment utilized for flight testing, including flight test instrumentation and facilities for monitoring and processing of data. Some problems encountered during the flight test period are described, and the flight test techniques used are reviewed. Author

A84-12772

THE LHX PRELIMINARY DESIGN PROCESS

D. P. SCHRAGE (U.S. Army, Aviation Research and Development Command, St. Louis, MO) Vertiflite (ISSN 0042-4455), vol. 29, Nov.-Dec. 1983, p. 14-17.

An account is given of the methodology being used by the U.S. Army Materiel Development Command for the formulation of the LHX advanced light helicopter concept, with attention to the interactions among combat mission developers, materials developers, and industrial groups, during the preliminary design process. The LHX family of 8000-lb class aircraft will encompass a utility airframe, for Army units in which a full squad-carrying capacity is not required, and a scout/attack, or 'SCAT', airframe, which shares dynamic components with the LHX utility craft. Determining technology availability and powerplant suitability in the preliminary design process has required a detailed technical

assessment and trade-off analysis for many critical design parameters. O.C.

A84-12773

THE AH-64A APACHE - READY FOR THE BATTLEFIELD

C. DRENZ Vertiflite (ISSN 0042-4455), vol. 29, Nov.-Dec. 1983, p. 20-22.

A total of over 4000 test hours have been flown on the YAH-64 prototypes of the AH-64A Apache Advanced Attack Helicopter, which have demonstrated flight performance levels meeting or exceeding all Army requirements. These include a vertical climb rate of 450 ft/min, a cruise speed of 145 knots with eight HELLFIRE missiles, 320 rounds of 30-mm ammunition, and fuel for a 1.83-hr mission at standard hot day conditions for 4000-ft altitude. The Apache exhibits superior nap-of-the-earth flight, low vibration, sideward flight, and high maneuverability. Attention is given to the avionics, combat survivability, crashworthiness, deployability, and reliable-available-maintenance concept of the Apache. O.C.

A84-12774

THE AHIP - EYES AND EARS OF THE BATTLEFIELD COMMANDER

W. FORSTER (U.S. Army, Washington, DC) Vertiflite (ISSN 0042-4455), vol. 29, Nov.-Dec. 1983, p. 23-25.

The main objective of the U.S. Army Helicopter Improvement Program (AHIP) is the modification of existing OH-58A helicopters to provide a scout aircraft which is not limited in performance and agility, possesses all equipment needed for day/night target acquisition and designation, and carries adequate navigation and communications equipment. The resulting AHIP OH-58D configuration features a state-of-the-art propulsion system, a Mast-Mounted Sight located above the rotor which includes TV, thermal imaging and laser rangefinder/target designator, and the cockpit's Controls and Display System (CDS). The CDS has been designed and arranged in view of cockpit size, crew coordination, external visibility, and data presentation priorities. AHIP is presently more than halfway through its full scale engineering development program. O.C.

N84-10049*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif
NUMERICAL CALCULATION OF THE TRANSONIC POTENTIAL FLOW PAST A CRANKED WING

I. C. CHANG and M. TAUBER Sep. 1983 13 p refs (NASA-TM-84391; A-9452; NAS 1 15:84391) Avail: NTIS HC A02/MF A01 CSCL 01C

The widely transonic swept-wing code, FL022, was found to have an error in the transformed flow equation in the computational domain. The revised version of the code correctly accounted for the non-straight leading edge geometry and its effect on the pressure distribution. Author

N84-10050# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

AN-32 TRANSPORTATION AIRCRAFT, USSR

12 Jul. 1983 9 p Transl into ENGLISH from Tekh. Lotnicza Astronautyczna (Poland), v. 34, no 8, 1979 p 17-18 (AD-A131013; FTD-ID(RS)T-0853-83) Avail: NTIS HC A02/MF A01 CSCL 01C

An-32 is the developmental version of the well known family of passenger and transportation aircraft. The basic difference, compared to earlier versions, is the use of engines with considerably greater power (about 80%). The latter makes it possible to use the aircraft while retaining proper performance in airfields situated in high mountains and in tropical climate zones. The engines are situated above the wing to protect them from dust and dirt entrained from the ground. The aerodynamic changes in the wing (use of spoilers) are to improve the performance of the aircraft in the takeoff and landing phase, and the larger stabilizing fins (below the control surfaces) increase directional stability in the event of failure of one engine. GRA

N84-10051#

Aeronautical Research Labs., Melbourne (Australia).

AIRCRAFT FATIGUE, WITH PARTICULAR EMPHASIS ON AUSTRALIAN OPERATIONS AND RESEARCH

J. Y. MANN Apr 1983 91 p refs

(AD-A131036; ARL/STRUC-TM-361) Avail: NTIS HC A05/MF A01 CSCL 01C

This Technical Memorandum forms the basis for the 9th Plantema Memorial Lecture to be presented by the author at the biennial meeting of the International Committee on Aeronautical Fatigue (ICAF) at Toulouse, France in May 1983. It traces the history of aircraft structural fatigue until the establishment of the Aeronautical Research Laboratories in 1939, and then deals more specifically with Australian contributions in research and development from then until the present time. These reflect both the lead-the-fleet situation for civil aircraft within Australia and the desire to operate some military aircraft for lives well in excess of their original design lives. GRA

N84-10052#

Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex. Industrial Hygiene Dept.

OZONE SURVEY OF C-9A Final Technical Report, Apr. - May 1982

P. A. LURKER and G. D. SWOBODA Jul 1982 37 p refs (AD-A130632; OEHL-TR-82-5) Avail: NTIS HC A03/MF A01 CSCL 01C

The United States Air Force (USAF) uses the C-9A aircraft, which is the McDonnell Douglas DC-9, for aeromedical evacuation of patients. Based on results from previous USAF Occupational and Environmental Health Laboratory (USAF OEHL) ozone surveys of the C-141B and C-5A cargo aircraft, Headquarters Military Airlift Command requested an ozone evaluation of the C-9A. Two Columbia Scientific Industries CSI-2000 ozone meters, chemiluminescent devices that are specific for ozone, were used to measure the cabin ozone. The Federal Aviation Administration (FAA) has published a standard restricting the cabin ozone levels to no more than 0.250 ppm (sea-level corrected) ceiling concentration and to a 0.1 ppm (sea-level corrected) time-weighted average (TWA) for flight segments greater than three hours. Of concern, are the ozone levels present in the C-9A interior and whether these levels will affect patients with illness or injury that can be synergistic with ozone exposure (i.e., respiratory dysfunctions). In closing, forecasts based on TOMS maps and the synoptic meteorological features could be implemented to provide a pre-flight notification to the flight crew of a potential ozone exposure to themselves and the passengers. The ozone forecast under development can provide information on which flight levels that high ambient ozone levels will be encountered. The pilot can decide whether to fly below the ozone or around any isolated pockets. As for aeromedical evacuation, the flight crew can refer any significant ozone forecast to the medical crew for a decision on deferring the aeromedical evacuation of a patient or use of supplemental breathing oxygen. GRA

N84-11117# Lockheed-California Co., Burbank. Advanced Flutter and Dynamics Methods.

PRELIMINARY AEROELASTIC DESIGN OF STRUCTURES (PADS) METHODS DEVELOPMENT AND APPLICATION

N. A. RADOVICICH In AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 29 p Sep. 1983 refs Avail: NTIS HC A14/MF A01

Preliminary Aeroelastic Design of Structures (PADS) is a highly computerized design system for generating structural weight data which include aeroelastic effects for advanced aircraft configurations. These data can then be used to update the statistical and semianalytical weight data base during configuration tradeoff studies. Three aspects of PADS are discussed: the formulation of computer operating system technology and data management techniques which will permit the definition and execution of engineering processes in a user friendly environment; a definition of engineering processes for preliminary aeroelastic design of structures which may be used to design an aircraft for strength and stiffness in the elapsed time normally available for a

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conceptual design phase; and the presentation of results from the PADS validation effort, computer software as well as engineering processes, using a known airplane design data base.

R J.F.

N84-11119# Boeing Military Airplane Development, Seattle, Wash.

AEROELASTIC TAILORING OF HIGH-ASPECT-RATIO COMPOSITE WINGS IN THE TRANSONIC REGIME

C. J. BORLAND and D. W. GIMMESTAD /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 12 p Sep 1983 refs

Avail: NTIS HC A14/MF A01

A procedure for coupling a rapid, accurate transonic aeroelastic analysis method, based on nonlinear small disturbance theory, with a simple design optimization method for high aspect ratio composite box beam type structures is described. A sample aeroelastically tailored preliminary design employing nonlinear transonic aerodynamics is presented. Currently available aeroelastic tailoring methods for composite aircraft structure employ linearized analysis of aeroelastic loads in the optimization cycle. For aircraft whose primary structural design conditions lie in the transonic regime, however, these loads may be considerably in error and may therefore lead to an other than optimum design. For aircraft with advanced technology or supercritical airfoil sections, the aerodynamic loading is extremely sensitive to changes in shock position and strength, which are affected in turn by small changes in geometry due to aeroelastic loading.

R.J.F.

N84-11120# British Aerospace Aircraft Group, Weybridge (England).

AEROELASTIC DESIGN OF CIVIL TRANSPORTS AT THE PROJECT STAGE

R. E. J. BRAZIER, A. E. DUDMAN, and B. W. PAYNE /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 11 p Sep 1983

Avail: NTIS HC A14/MF A01

The concepts of aeroelastic design of civil transports at the project stage are outlined. The formulation of the data and computing requirements are described, as well as the aeroelastic predictions to the project design. The design of a competitive civil transport aircraft must take account of aeroelastic effects and aeroelastic requirements at the project stage. The overall design will be decided by other considerations but the final tuning of the design, leading to structural/performance optimization has to include aeroelastic data on static distortion, dynamic loading and flutter requirements. In order to be able to produce these data at the project stage, where geometry and configuration changes need to be assessed rapidly, a system was developed by which quick and reliable predictions can be made.

R.J.F.

N84-11126# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).

AEROELASTIC DESIGN CONSIDERATIONS IN THE DEVELOPMENT OF HELICOPTERS

H. STREHLOW and B. ENENKL /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 25 p Sep 1983 refs

Avail: NTIS HC A14/MF A01

There are a number of aeroelastic phenomena associated with the design of helicopters. The dynamic stability and response characteristics of rotary wing aircraft are dependent on parameters which have to be defined in the preliminary design phase. The type of rotor and its control determine largely the aeroelastic behavior of a helicopter. Of special interest are nowadays hingeless and bearingless rotor systems. Aeroelastic design considerations for these rotor types are discussed. Coupling effects due to geometric nonlinearities and blade root attachments with recone, droop, sweep and offsets are of great importance with respect to the aeroelastic stability and must be considered carefully in a preliminary phase. In addition, stability and vibration problems call for exact blade tuning possibilities, which in turn require an analytical understanding. Coupling between rotor and fuselage may

have significant effects on aeroelastic stability and response. Design parameters related to this complex area are also discussed.

Author

N84-11128# Sikorsky Aircraft, Stratford, Conn.

AEROELASTIC CONSIDERATIONS IN THE DESIGN OF HIGH SPEED ROTORS

W. L. MIAO and R. H. BLACKWELL /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 16 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

The high speed requirement dictates that the rotor design be simple and clean. Elimination of blade articulations as well as pitch bearings and lag dampers is emerging as a candidate technology for such a rotor. The resulting bearingless type rotor design has to deal with the question of rotor stability and the coupled rotor/airframe stability. The merits of the stiff inplane design versus the soft inplane design in light of the stability issues are discussed. The philosophy of introducing blade bending torsion couplings to improve stability characteristics is substantiated. As vibration potential increases with airspeed exponentially and may become a limiting factor to the speed achievable, reducing vibration should be an integral part of the aeroelastic considerations for high speed rotor. Parameters that can reduce vibrations are discussed generically. Sensitivities of vibration are shown for blade bending and torsion stiffnesses, mass distribution, frequency and mode shape.

Author

N84-11129# Societe Nationale Industrielle Aerospatiale, Marignane (France).

ESTIMATED ANALYSIS OF THE AEROELASTIC BEHAVIOR OF TAIL ROTORS [ANALYSE PREVISIONNELLE DU COMPORTEMENT AEROELASTIQUE DES ROTORS ARRIERE]

G. GENOUX and G. BLACHERE /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 22 p Sep. 1983 refs In FRENCH

Avail: NTIS HC A14/MF A01

A relatively precise knowledge of the aeroelastic behavior of helicopter rotors is necessary for their optimum sizing and maximum safety. In the case of tail rotors, behavior prediction is complex because of the dynamic environment, aerodynamics, and their particular operating conditions (passage range, important twisting action, regime ..). Complete modeling of the behavior of the anti-torque rt rotor and of helicopter structure is difficult at the estimation stage. Despite inherent limitations at this step, the approach consists in creating an ensemble of specialized models adapted to the types of rotors studied, of reasonable shape, which permits an estimated knowledge of the most important problems. Certain methods used at Aerospatiale for the study and aeroelastic adjustment of tail rotors are described as well as their application to different concepts (articulated rotors, rotors made of composites, and "fenestrons".

Transl. by A.R.H.

N84-11130# Politecnico di Milano (Italy). Dept. of Aerospace. **THE ROLE OF AEROELASTICITY IN THE PRELIMINARY DESIGN OF HELICOPTER ROTORS**

V. GIAVOTTO, M. BORRI, A. RUSSO (Costruzioni Aeronautiche Giovanni Agusta S.p.A., Varese, Italy), and A. CERIOTTI (Costruzioni Aeronautiche Giovanni Agusta S.p.A., Varese, Italy) /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 8 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

The design of a helicopter rotor is a complex process, in which aeroelastic aspects are involved practically at all stages. As the integration of the different models employed in the design needs to be rationalized, integrated computation system shall be developed, whereby aeroelasticity can be taken into account since the earliest stages. This paper shows the first significant results of a development activity of this kind carried out by AUGUSTA in cooperation with POLITECNICO of Milano.

Author

N84-11131# Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France).

AEROELASTICITY AND OPTIMIZATION AT THE DESIGN STAGE [AEROELASTICITE ET OPTIMISATION EN AVANT-PROJET]

C PETIAU and D. BOUTIN /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 18 p Sep. 1983 refs In FRENCH

Avail: NTIS HC A14/MF A01

A procedure developed for static and dynamic structural analysis is completed in several weeks using a three view scheme of the aircraft, laws of the relative mass of wing units, a summary definition of the internal architecture, a choice of materials, and construction technology. For each version studied, calculation at the design stage involves: (1) a first finite element analysis of rough planning with sampling and simplified loads; (2) analysis of problems of static aeroelasticity, computation of loads by accounting for aeroelasticity, and the automatic study of surrounding loads; (3) computation of flutter with a study of critical configurations with exterior loads removed; and (4) the automatic optimization of sampling, supplying the minimal weight of the structure that satisfies the constraints of static behavior, of aerodistortion limitations, and of the speed of velocity of flutter. A combat aircraft with wings made composite materials is analyzed

A.R.H

N84-11132# British Aerospace Aircraft Group, Preston (England).

AEROELASTIC CONSIDERATIONS IN PRELIMINARY DESIGN OF A MILITARY COMBAT AIRCRAFT

M. ORMEROD and D. G. GIBSON /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 12 p Sep 1983 refs

Avail: NTIS HC A14/MF A01

This report gives an outline of the aeroelastic considerations taken into account during the early stages of a modern combat aircraft design. It describes the manner in which the aerodynamic performance requirements are balanced against what can be achieved by structural optimization. At the same time, flutter characteristics are established in such a way that as many as possible of the design features that are potentially critical for flutter are identified. It is shown that these procedures can produce structure that achieves the selected performance targets and give adequate fundamental (bending/torsion) flutter speeds. However, there are significant secondary effects associated with items such as tip missiles, control surface actuation and underwing stores that have to be treated carefully if meaningful design advice is to be given before the design is frozen

Author

N84-11133# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Airplane Div.

PRELIMINARY DESIGN OF AIRCRAFT USING STRUCTURAL OPTIMIZATION METHODS

H. GOEDEL, G. SCHNEIDER, and H. HOERNLEIN /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 13 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

Weight minimized surfaces of a modern high performance aircraft have to fulfill statical, dynamical and aeroelastical requirements such as highly maneuverable aircraft, high control surface effectiveness, no flutter in the mission domain. To meet these requirements it is necessary to improve the optimization procedures and applicate them even in the preliminary design phase of an aircraft to become acquainted with the influence of the main design parameters. The presented paper deals with the activities at MBB in the field of structural optimization. The presented paper deals with the activities at MBB in the field of structural optimization. The theoretical background of the optimization will be described with special regard to the constraints such as stresses, deflections in conjunction with control surface effectivenesses, flutter speed and side limits. Flutter speed optimization is based on an optimality criterion including physical facts whereas for the other constraints mathematical programming procedures are used. By means of well known test examples, a

vertical tail structure and a simplified wing structure the capabilities of the applied optimization program systems are shown and results are presented.

Author

N84-11160# Committee on Science and Technology (U. S. House).

JOINT SERVICES ADVANCED VERTICAL WING (JVX) PROGRAM

Washington GPO 1983 121 p Hearing before the Subcomm. on Transportation, Aviation and Mater. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 11, 2 May 1983

(GPO-22-771) Avail: Subcommittee on Transportation, Aviation and Materials

The advanced vertical lift program and tilt rotor research aircraft are reviewed. The technology of this aircraft is emphasized including what this airplane or helicopter or combination of the two can do and how it relates to both military and civilian needs. This program is an effort to develop and produce an aircraft which combines vertical lift capability with airplane cruise efficiency in order to satisfy the various mission requirements of the military services. The tilt rotor technology is being evaluated to determine if it is suitable for mission requirements identified by the military services.

S.L

N84-11161# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

QIANG 5 ATTACK AIRCRAFT OF THE PRC

19 Jul. 1983 11 p Transl. into ENGLISH from Conmilit (China), Jan. 1983 p 36-39

(AD-A131058; FTD-ID(RS)T-0222-83) Avail: NTIS HC A02/MF A01 CSCL 01C

The Qiang-5 aircraft design is analyzed. Its performance characteristics are discussed.

S.L

N84-11162# Bunker-Ramo Corp., Westlake Village, Calif Electronic Systems Div.

SYMBOLOLOGY VERIFICATION STUDY Final Report, 1 Nov. 1978 - 30 May 1979

C. J. KOPALA (AFWAL), J. M. REISING (AFWAL), G. L. CALHOUN, and E. L. HERRON Wright-Patterson AFB, Ohio AFWAL Jan. 1983 123 p refs

(Contract F33615-78-C-3614, F33615-81-C-3620; AF PROJ. 2403) (AD-A131328; AFWAL-TR-82-3080) Avail: NTIS HC A06/MF A01 CSCL 01C

The Department of Defense is currently working on a real-time combat situation display to be used in fighter cockpits. This study was performed to evaluate a proposed symbology set for real time combat situation displays in fighter aircraft. The primary objective was to compare pilot performance under two different coding conditions: shape coding only, and both color and shape coding. Color coding was found to significantly reduce overall average response time, with this effect becoming more pronounced with increasing symbol density. The second purpose of the study was to compare performance differences among the symbol types for each of the three states (friendly, unknown, or hostile). Data on this topic is evaluated and possible explanations for discrepancies are noted

GRA

N84-11163# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

DEVELOPMENT AND FLIGHT TEST OF AN ACTIVE FLUTTER SUPPRESSION SYSTEM FOR THE F-4F WITH STORES. PART 2: GROUND TESTS AND SUBCRITICAL FLIGHT TESTS Final Report, Mar. 1978 - Mar. 1980

H. HOENLINGER, D. MUSSMAN, R. MANSER, and L. J. HUTTSELL Apr. 1983 156 p refs

(Contract AF PROJ 2401) (AD-A131402, AFWAL-TR-82-3040-PT-2) Avail: NTIS HC A08/MF A01 CSCL 20D

A flutter suppression system was developed and flight tested on an F-4F aircraft. The control law was designed using optimal control theory to minimize the control surface motion and to provide the required stability margins. During the test it was found that

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the dynamic behavior of the wing-pylon-store changed considerably with excitation amplitude due to free play and preload. The active flutter suppression system worked well and provided an increase in flutter speed. GRA

N84-11164# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.
YC-15 EBF (EXTERNALLY-BLOWN FLAP) STOL (SHORT TAKEOFF AND LANDING) AIRPLANE FUSELAGE AND INTERIOR NOISE ENVIRONMENT Final Technical Report, Oct. 1981 - Feb. 1983

V. R. MILLER May 1983 81 p refs
(Contract AF PROJ. 2401)
(AD-A131462; AFWAL-TM-83-170-FIBE) Avail: NTIS HC A05/MF A01

The purpose of this effort was to investigate the exterior fuselage and interior noise of the USAF/McDonnell-Douglas YC-15 Advanced Medium-Range Short-Takeoff- and Landing Transport airplane. This aircraft employs an under-the-wing, externally-blown-flap powered lift system designed to create augmented lift, which creates an intense acoustic environment. The blowing of the flap produces higher noise levels at lower frequencies than does the jet alone, increasing the acoustic environment of the fuselage and inside the cabin. A combination of exterior flush-mounted microphones, accelerometers, interior centerline and sidewall microphones were used during this investigation. Test conditions analyzed included takeoff, cruise, landing, taxi, and ground static over the full range of operating conditions. The effects of different flight parameters are displayed in the form of the octave, one-third octave, and narrowband plots and are compared to the changes on the acoustic environment.

Author (GRA)

N84-11165# Air Force Academy, Colo.
LIMITED PERFORMANCE AND FLYING QUALITIES VALIDATION OF THE SGM 2-37 POWERED SAILPLANE

K. R. CRENSHAW and D. G. PICHA Jun. 1983 113 p refs
(AD-A131445; USAFA-TN-83-9) Avail: NTIS HC A06/MF A01

A limited performance and flying qualities validation of the SGM2-37 powered sailplane was conducted in order to verify contract requirements and to evaluate the overall capability of the aircraft to satisfy mission requirements. The SGM2-37 aircraft meets all contract requirements except for exceeding the maximum takeoff ground run of 1000 feet; the minimum sink rate 240 rate feet per minute, exceeding the approach glide slope of 7 to 1 and failing to achieve a wings level stall speed between 35 and 45 mph. Failure to meet these requirements was not objectionable and did not detract from the operational capability of the aircraft. Problems with cockpit control movement of the left seat airbrake handle and with the control stick were identified along with erratic and inaccurate fuel quantity indicator displays. GRA

N84-11166# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

A MODEL TO INVESTIGATE LOSSES AND EXCHANGE RATIOS IN LARGE-SCALE AIR-TO-AIR ENGAGEMENTS M.S. Thesis

R. J. BOGUSCH Mar. 1983 188 p refs
(AD-A131410; AFIT/GST/OS/83M-1) Avail: NTIS HC A09/MF A01

There is no available technology for studying the results of tactical air-to-air engagements involving more than 16 aircraft. A computer model based on a central European NATO-Warsaw Pact conventional conflict was built using FORTRAN 77 and the SLAM simulation language. This model allows engagements of 144 aircraft. Blue aircraft operating from CAP patterns defend against Red fighter-bombers escorted by Red fighters. Only two types of aircraft are modeled: the McDonnell-Douglas F-15 and the MIG-23/27. The model is empirically based and simulates the physical movement of the aircraft, radar and visual detection, and employment of radar and heat-seeking air-to-air missiles and aerial cannon. GRA

N84-11167# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany).

MODIFICATION OF WING DESIGN TO INCREASE LIFT FOR FUTURE AIRBUS DERIVATIVES (NEW) Final Report, Jul. 1982
B. EWALD Bonn Bundesministerium fuer Forschung und Technologie Jun. 1983 69 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-W-83-005; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14,50

Two methods to increase modern transport aircraft payloads, especially for Airbus A 300 B4, are reported. Tests with canard wings at the forward part of the fuselage prove to be aerodynamically successful, but application was postponed due to structural problems. Additional spanwise trailing edge camber, carefully tuned, results in 7.5% lift increase at cruising speed. This modification was introduced in the A 300-family and the wing for A 300-600 was defined. Minor modifications on the wing, a study with winglets and an investigation of the aerodynamics of over-the-wing nacelles resulted in clear improvements.

Author (ESA)

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AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

A84-10017*#
DISTRIBUTED ASYNCHRONOUS MICROPROCESSOR ARCHITECTURES IN FAULT TOLERANT INTEGRATED FLIGHT SYSTEMS

W R DUNN (Southern Colorado, University, Pueblo, CO) IN: Computers in Aerospace Conference, 4th, Hartford, CT, October 24-26, 1983, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, 1983, p 115-123. refs
(Contract NCC2-091)
(AIAA PAPER 83-2342)

The paper discusses the implementation of fault tolerant digital flight control and navigation systems for rotorcraft application. It is shown that in implementing fault tolerance at the systems level using advanced LSI/VLSI technology, aircraft physical layout and flight systems requirements tend to define a system architecture of distributed, asynchronous microprocessors in which fault tolerance can be achieved locally through hardware redundancy and/or globally through application of analytical redundancy. The effects of asynchronism on the execution of dynamic flight software is discussed. It is shown that if the asynchronous microprocessors have knowledge of time, these errors can be significantly reduced through appropriate modifications of the flight software. Finally, the paper extends previous work to show that through the combined use of time referencing and stable flight algorithms, individual microprocessors can be configured to autonomously tolerate intermittent faults. Author

A84-10046#
ARTIFICIAL INTELLIGENCE - AN IMPLEMENTATION APPROACH FOR ADVANCED AVIONICS

L. C. KLOS, J. A. EDWARDS, and J. A. DAVIS (General Dynamics Corp., Fort Worth, TX) IN: Computers in Aerospace Conference, 4th, Hartford, CT, October 24-26, 1983, Collection of Technical Papers New York, American Institute of Aeronautics and Astronautics, 1983, p. 300-307.
(AIAA PAPER 83-2401)

The potential improvement of avionics performance through the application of Artificial Intelligence (AI) techniques is discussed. An approach is developed which organizes the avionics software in a manner that allows both conventional programming and AI practices to furnish intelligent assistance to pilots. Real time route

programming, longer detection ranges, better fault isolation, etc. are achievable through the application of AI techniques in a framework comprising several levels of intent-driven system operation. O.C.

A84-10668*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

FLIGHT MANAGEMENT OF ADVANCED SYSTEMS IN THE CREW STATION

S. A. MORELLO and G. G. STEINMETZ (NASA, Langley Research Center, Hampton, VA) Institute of Electrical and Electronics Engineers and American Institute of Aeronautics and Astronautics, Digital Avionics Systems Conference, 5th, Seattle, WA, Oct. 31-Nov. 3, 1983, Paper. 9 p.

The present investigation is concerned with studies which are being conducted to explore the integration of advanced flight control/management concepts for both near and far term application. A description is given of a simulation experiment in which several elements of a transport type aircraft system design are examined. Attention is also given to research related to advanced systems/flight management information and computations development for piloted simulation and flight testing. An initial set of informational, control, and layout requirements for an advanced crew-station research facility is also presented.

G.R.

A84-10792

AN EQUIPMENT FOR SIMULATING AIRBORNE RADAR VIDEO

T. SNOWBALL, T. R. BERRY, and A. M. PARDOE (Royal Signals and Radar Establishment, Malvern, Worcs., England) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982 London, Institution of Electrical Engineers, 1982, p. 250-253.

For a long time, a market has existed for cheap flexible radar video simulators. In the future, this market will probably increase significantly in connection with the emergence of digital scan converted airborne displays. The present investigation is concerned with the development of a versatile but inexpensive simulator. The main advantages of this simulator are that the radar video is easily adaptable, while a whole range of radar equipments and usage can be represented at very low cost. The considered system is based on the use of a cheap TV Vidicon camera which looks at a moving strip film.

G.R.

A84-11060#

DISPLAY-ORIENTED COCKPIT FOR LOW-LEVEL NIGHT FLIGHT (EXPERIMENTAL PROGRAM NSC) [BILDSCHIRMORIENTIERTES COCKPIT FUER DEN NACHTTIEFFLUG (EXPERIMENTALPROGRAMM NSC)]

P. WOLFF and H. HAUCK (Dornier System GmbH, Friedrichshafen, West Germany) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 1. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 29 p. In German.

Presently, electronic systems and devices are still only little used in helicopter cockpits. However, in connection with rising demands concerning the employment of the helicopter in application areas which were up to now closed to it, it has to be expected that a development will take place which is at least comparable to that occurring in the case of other types of aircraft. The greatest challenge regarding the development of the helicopter cockpit of the future is related to the demand to achieve a night flight capability, taking into account the possibility of conducting low-level flights in the vicinity of obstacles. A necessary condition for the solution of the problems involved in providing this capability is the availability of efficient, economically priced night vision sensors. A crucial factor is the presentation of the relevant information and data to the pilot on appropriate display devices. Attention is given to details of data indication, the arrangement of the control elements, and military and technical requirements

G.R.

A84-11074

FLIGHT DECKS OF THE FUTURE - TECHNOLOGY EXPLODES

W. R. PADEN, JR (Lockheed-Georgia Co., Marietta, GA) Lockheed Horizons, no. 13, 1983, p. 18-23.

Design features of a flight simulator crew station for commercial aircraft in the 1990s are described. The avionics displays include CRTs and flat panel devices, touchpanel controls, voice command and response systems, HUDs, and electronic or fly-by-wire flight and thrust controllers. The design selected was optimized for a two-member flight crew and easy reconfigurability. All controls are accessible to both pilots, and displays can be transferred from one screen to another. Criteria developed to determine if data should be displayed continuously or on command led to the definition of categories for primary flight data, normal flight data, display failure operation, and in pilot switching conditions. The goal of the new flightdeck design is to reduce crew workload and increase situational awareness. M.S.K.

A84-11171

A REVIEW OF UK DEVELOPMENTS IN AIRCRAFT FUEL MANAGEMENT SYSTEMS

M. A. BEENY (Royal Aircraft Establishment, Farnborough, Hants, England) Aeronautical Journal (ISSN 0001-9240), vol. 87, Oct. 1983, p. 301-320. refs

Flight trials have indicated that the application of digital gauging to aircraft fuel management will provide increased accuracy over a range of aircraft attitudes, with greater reliability than current analog systems. In military aircraft, microprocessor-based fuel management systems integrating fuel measurement, transfer and warning functions will reduce pilot workload, and result in higher system integrity, fault detection, and ease of system reconfiguration following battle damage. O C

A84-11622

AIRSPEED AND WIND SHEAR MEASUREMENTS WITH AN AIRBORNE CO₂ CW LASER

A. A. WOODFIELD (Royal Aircraft Establishment, Bedford, England) and J. M. VAUGHAN (Royal Signals and Radar Establishment, Malvern, Worcs., England) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 207-224. refs

Equipment characteristics and trial results with a CO₂ lidar unit tested on board a RAE HS 125 aircraft as a wind shear detector are reported. The laser true airspeed system (LATAS) has a frequency response of 100 MHz and is cooled to -196 K with liquid nitrogen. The beam is centered on the P(20) transition through use of an optical filter, and the system is designed to cover a velocity range from 0-635 kt. The on-board processing equipment measures the spectrum width and average velocity at a level below the peak response. The system has been used for 12 mos in flight tests without requiring recalibration, and a 20 cm Ge window at the beam exit has exhibited no deterioration. Data have been taken during a climb to 43,000 ft, in a severe thunderstorm, and in the form of return signals from clouds, rain, and the ground. The system is concluded reliable for wind shear detection, an autothrottle speed sensor, and for pressure error measurement detection, and potentially as a ground speed indicator during approach. M.S.K.

A84-11624

AN ALTERNATIVE TO AIRBORNE RADAR FOR THUNDERSTORM AVOIDANCE

M. DIBLE (Martin-Baker Aircraft Co., Ltd., Higher Denham, Middx, England) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 242-244.

The Stormscope display and instrumentation for aircraft avionics is equipped to detect and range isolated cumulonimbus clouds. The passive device measures noise in the 50 kHz band, and has the capability of displaying up to 256 continuously updated discharge dots that indicate stormclouds. The instrument can detect thunderstorms within alternate ranges of 25, 50, 100, and 200 nmi and enable courses to be plotted between storms. The Stormscope is regarded as a complement, not a replacement, for weather radar, and can be easily installed on aircraft currently

06 AIRCRAFT INSTRUMENTATION

without radar. The Stormscope can also be used while on the ground, and an instance is cited when a pilot who had just landed supplied Stormscope data to supplement ATC radar data, which does not register precipitation. M.S.K.

A84-11625

COCKPIT CRT DISPLAY TIRE PRESSURE INDICATING SYSTEM

International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 245-254.

The design and performance features of a cockpit tire pressure display system that is used on the A 310 Airbus are described. Tire pressure is transformed by sensors into an electrical signal which is processed by computer and converted into a display reading. Warning messages may be issued by the computer if an underinflated tire is detected, an excessive pressure difference is noted on wheels on the same axle, or if the system has a component failure. The pressure sensor is located in the wheel rim and issues an analog signal proportional to the pressure. The power supply is an electronic module located in the wheel spindle ends. Cost-savings resulting from regular tire condition inspections are detailed. M.S.K.

A84-12311*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif

AN AUTOMATED STALL-SPEED WARNING SYSTEM

D. O. WILNER and G. A. BEVER (NASA, Flight Research Center, Edwards, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 14 p. (AIAA PAPER 83-2705)

The NASA Dryden Flight Research Facility embarked upon a project with the United States Army Aviation Engineering Flight Activity (USAAEFA) to develop and test a stall-speed warning system. NASA designed and built an automated stall-speed warning system which presents both airspeed and stall speed to the pilot. The airspeed and stall speed are computed in real time by monitoring the basic aerodynamic parameters (dynamic pressure, horizontal and vertical accelerations, and pressure altitude) and other parameters (elevator and flap positions, engine torques, and fuel flow). In addition, an aural warning at predetermined stall margins is presented to the pilot through a voice synthesizer. Once the system was designed and installed in the aircraft, a flight-test program of less than 20 hr was anticipated to determine the stall-speed software coefficients. These coefficients would then be inserted in the system's software and then test flown over a period of about 10 hr for the purposes of evaluation. Author

A84-12326#

INSTRUMENTATION FOR IN-FLIGHT ACOUSTIC MEASUREMENTS IN AN ENGINE INTAKE

S. S. VAN LEEUWEN (Nationaal Lucht- en Ruimtevaartlaboratorium, Amsterdam, Netherlands) and T. ZANDBERGEN (Nationaal Lucht- en Ruimtevaartlaboratorium, Emmeloord, Netherlands) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 7 p. refs (AIAA PAPER 83-2733)

Acoustic measurements were carried out in the engine intake ducts of the Fokker F28 test aircraft during flight. One of the low-bypass-ratio engines having a hard-walled intake was instrumented to detect the circumferential modes of the sound field. Also, aerodynamic measurements were carried out to determine the flow conditions in the intake near the wall. In the other engine the impedance of the inlet acoustic liner was measured. This report describes the instrumentation for both the acoustic measurements and the aerodynamic measurements. Furthermore, an error analysis of the instrumentation is given. It is concluded that the in-flight measurement of acoustic pressure ratios with an accuracy of 3.56 per cent and 2.61 degrees and the measurement of stationary pressures with an accuracy of 0.55 per cent is feasible. Author

A84-12327*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

CLOUD PARTICLE EFFECTS ON LAMINAR FLOW AND INSTRUMENTATION FOR THEIR MEASUREMENT ABOARD A NASA LFC AIRCRAFT

R. E. DAVIS and M. C. FISCHER (NASA, Langley Research Center, Hampton, VA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 11 p. refs

(AIAA PAPER 83-2734)

Fuel costs account now for approximately 60 percent of the direct operating costs of airlines and future commercial transport will utilize advanced technologies for saving fuel on the basis of drag reduction. Laminar flow control (LFC) represents such an advanced technology. A new laminar flow wing on a reconfigured WB-66 aircraft was tested in the X-21 flight program. The tests confirmed that extensive laminar flow could be achieved at subsonic transport cruise conditions. Factors affecting adversely the maintenance of laminar flow were found to be related to ice particles encountered during the penetration of cirrus clouds or haze. The present investigation is concerned with the effect of ice particles on LFC, taking into account the results obtained in the Leading Edge Flight Test (LEFT) being conducted by NASA. Attention is given to ice particle measurements in the LEFT program. G.R.

A84-12330#

APPLICATIONS OF INERTIAL SYSTEMS AS FLIGHT TEST SENSORS

F. PARLINI (Boeing Commercial Airplane Co., Seattle, WA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p. (AIAA PAPER 83-2738)

Boeing Flight Test now has experience with several different inertial systems used on commercial aircraft. These systems were initially attractive as Flight Test sensors for their basic attitude and acceleration outputs because of their inherent accuracy. An understanding of the operation and response characteristics of the systems and the effects of their location is necessary to take maximum advantage of them. The expected replacement of dedicated sensors has not materialized, but experience has allowed Boeing Flight Test to use inertial outputs as inputs to more complicated analysis routines, include computation of winds, calibration of sideslip sensors, and measurements of altitude and static pressure. Author

A84-12344#

DESCRIPTION AND APPLICATION OF A STAND-ALONE AIRBORNE AERODYNAMIC DATA-RECORDING SYSTEM

C. T. KIDD and W. K. CRAIN (Calspan Field Services, Inc., Arnold Air Force Station, TN) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 9 p. refs

(AIAA PAPER 83-2757)

A stand-alone airborne aerodynamic data-recording system developed primarily for the acquisition of flight-test heat-transfer data on externally carried stores is described. This airborne unit was designed and fabricated in support of a store-heating technology project. Although presently configured for the acquisition and recording of heat-transfer data, the system is quite versatile and can be used for the measurement of multiple aerodynamic flight-test parameters. The airborne unit is approximately 4.5 in. in diameter by 60 in. long and is electrically configured to collect, format, and store 104 channels of heat-flux and/or temperature data from an externally carried store. Basic components of the airborne system, associated ground support equipment, and data reduction methods are described. Results of wind tunnel and flight tests are presented and discussed. Author

N84-11101* Ohio Univ., Athens. Center for Avionics Engineering

ENHANCED CHARACTER SIZES FOR THE VDM-1 VIDEO DISPLAY BOARD

S. M. NOVACKI, III and J. D. NICKUM In NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 9-22 Oct. 1983 refs

Avail: NTIS HC A07/MF A01 CSCL 01D

Use of a microprocessor for providing navigation information from the inherent hyperbolic geometries of Loran-C was discussed. The advantages Loran-C offers over VOR/DME as a primary navigation aid are identified. These advantages include long range coverage by several stations, coverage at low altitudes, and the capability to have nonprecision approaches at airports not already served by landing aids. Modern digital electronic technology is used to produce a device to convert Loran-C data to useful pilot information using simple software algorithms and low cost microprocessor devices. The cost and lack of availability of suitable processors to execute these algorithms have prevented a Loran-C navigator from being developed. Results indicate that the microprocessor based Loran-C navigator has an accuracy of 1.0 nm or less over an area typically covered by a triad of Loran-C stations and can execute a position update in less than 0.2 seconds. Author

N84-11105* Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation.

LATERAL RUNWAY APPROACH GUIDANCE USING LORAN-C

R. W. SIMPSON In NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 81-87 Oct. 1983

Avail: NTIS HC A07/MF A01 CSCL 01D

The design and flight test of a lateral guidance system for flying approaches to a runway by general aviation aircraft are examined. The issue is whether or not good dynamic response can be obtained by exploiting the repeatable accuracy of Loran-C position data and combining it with heading rate data. The pilot needs cross pointer displays so he can keep the aircraft within approx. 75 feet of the runway centerline at approach speeds typical of general aviation aircraft. B.G.

N84-11168* Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

COMPUTER GENERATED PICTORIAL STORES MANAGEMENT DISPLAYS FOR FIGHTER AIRCRAFT Final Report, 1 Aug. 1980 - 30 Sep. 1981

A. J. ARETZ, J. M. REISING, C. J. KOPALA, G. L. CALHOUN, and E. L. HERRON May 1983 90 p refs

(Contract AF PROJ. 2403)

(AD-A131412; AFWAL-TR-83-3016) Avail: NTIS HC A05/MF A01

Four methods for presenting stores information on a cathode ray tube (CRT) were evaluated to determine which is best in terms of pilot performance: (1) alphanumeric format, (2) monochrome pictorial format, (3) color pictorial format, and (4) alphanumeric and color pictorial format. Results indicated that pilots performed equally well with the alphanumeric, color pictorial, and alphanumeric/color pictorial formats but that performance with the black and white pictorial format was significantly worse than all three of these formats. Subjective data indicated significant pilot preference for the alphanumeric/color pictorial format. These results indicate one potential advantage of color pictorial formats in the cockpit. Mainly, in addition to the specific information provided by the alphanumeric format, the color pictorial format provides a situational awareness where the pilot can obtain important information at a glance. GRA

N84-11169* VDO-Luftfahrtgeraete Werk Adolf Schindling G.m.b.H., Frankfurt (West Germany). Bereich Luftfahrt.

COMPUTER SYMBOL GENERATOR AND CONTROL PANEL FOR AN INTEGRATED COCKPIT COLOR DISPLAY INFORMATION SYSTEM Final Report, Jun. 1982

H. W. FISCHER, W. KLEIN, and F. MAGNIEN Bonn Bundesministerium fuer Forschung und Technologie Jul. 1983

158 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-W-83-007; ISSN-0170-1339) Avail: NTIS HC

A08/MF A01; Fachinformationszentrum, Karlsruhe, West

Germany DM 32,50

A cockpit color display system for airliners is presented. The system comprises a processor with an internal databus, a computer for data processing and a high speed strokewriting symbol generator. The latter works according to line-vector procedure which gives a high writing rate to control two displays. The control panel contains a twisted nematic liquid crystal alphanumeric display specially developed for this purpose. Due to its low reading angle, it is concluded that for serial construction a dichroic cell with sufficient contrast and lifetime is required. Author (ESA)

07

AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

A84-10295

DEVELOPMENT OF THE TORNADO THRUST REVERSER

D. EAGLES (British Aerospace PLC, Warton Div., Preston, Lancs., England) Society of Environmental Engineers, Journal (ISSN 0374-356X), vol. 22-3, Sept. 1983, p. 3-9.

The bucket design ensures that the reverse gas flow directs the jet sufficiently outwards to avoid gas reingestion. At the base of the fin, a gap was originally left to allow some sideways movement of the bucket mechanism during deployment. It was found, however, that the gap was a source of buffet and drag in normal flight. It is emphasized that the system is not designed for in-flight reverser operation. Single reverse operation is about to be explored, a number of single engine landings have already been made using the reverse from touchdown. An account is also given of the provision made to prevent the uptake of loose stones from the runway. C.R.

A84-10353

THE APPLICATION OF FERROGRAPHY TO THE CONDITION MONITORING OF GAS TURBINES

D. SCOTT (University College of Swansea, U.S. Army, and Scientific Society of Hungary, International Conference on Advances in Ferrography, 1st, Swansea, Wales, Sept. 22-24, 1982) Wear (ISSN 0043-1648), vol. 90, Sept. 15, 1983, p. 21-29. refs

A method of applying ferrography in such a way that gas turbines can be operated safely and economically is presented. Direct reading ferrographic trend analysis is seen as promising, and automation of the process has been established. It is pointed out that analytical ferrography can furnish essential information on specific vital components and can supplement information from other techniques to permit more accurate decisions to be made concerning gas turbine condition and maintenance action. Ferrography is seen as successfully bridging the gap in the detection of wear debris too large for detection by SOAP (spectrographic oil analysis procedure) and too small for detection by MDPs (magnetic detector plugs). Its use therefore prevents some failures of SOAP to detect the initiation of failure and expensive secondary damage before large debris is detected by MDPs. C.R.

A84-10572*# Wichita State Univ., Kans.

DESIGN STUDY OF A DUAL-CYCLE TURBOFAN-RAMJET ENGINE FOR A HYPERSONIC AIRCRAFT

G. W. ZUMWALT (Wichita State University, Wichita, KS) and S. SUWANPRASERT (Thai Airways International, Ltd., Bangkok, Thailand) American Institute of Aeronautics and Astronautics, Aircraft Design, Systems and Technology Meeting, Fort Worth, TX, Oct. 17-19, 1983. 8 p. refs (Contract NCC1-31) (AIAA PAPER 83-2484)

Computer modelling was used with two different designs of an advanced turboprop-ramjet in order to derive performance predictions. The engine would enable an aircraft to take-off, accelerate to Mach 5.0, and climb to 90,000 ft. The two concepts included a turboprop with a ramjet annularly wrapped around it and a side-by-side configuration with the ramjet having a rectangular shape and mounted alongside the turboprop. The studies were performed to model weight, length, fuel efficiency, and the requirements of the thrust/drag ratio to exceed unity over the entire flight path. LH2 would be used for fuel and to regeneratively cool the combustion chamber. Turboprop operation with and without afterburner and with and without the ramjet inlet open were examined, as were variable areas for the burners. A side-by-side configuration displayed the best performance predictions, with a ramjet mass flow being 75 percent that of the turboprop and maximum temperatures being equal. M.S.K.

A84-11055#

SHAFT PROPULSION SYSTEMS FOR HELICOPTERS OF THE NEXT GENERATION [WELLENTRIEBWERKE FUER HUBSCHRAUBER DER NAECHSTEN GENERATION]

J. HOURMOUZADIS and W. KLUSSMANN (Motoren- und Turbinen-Union Muenchen GmbH, Munich, West Germany) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 1. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 17 p. In German. refs

Modern helicopters incorporate in their design remarkable technological advances leading to a very significant improvement with respect to their flying properties. However, the propulsion units of the helicopters are in most cases still based on developments of the 1950s and 1960s. Only during the last few years, the manufacturers of helicopter propulsion systems have started to provide small turboshaft engines based on a utilization of advanced technology. Attention is given to design factors permitting a safe landing in the case of engine failure, problems of thermal stabilization, design features leading to a reduction in engine maintenance and life cycle costs, advances related to engine control, approaches for eliminating foreign objects, and the suppression of infrared radiation. G.R.

A84-11065#

THE CT7 TURBOSHAFT - COMMERCIAL ADAPTATION OF A MILITARY TURBOSHAFT ENGINE

R. E. GAERTTNER (General Electric Co., Small Commercial Engine Dept., Lynn, MA) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 12 p.

The CT7-2A helicopter propulsion engine, a commercial version of the T700 military engine, is characterized, emphasizing the advantages of an already complete military development program and extensive use experience for the commercial customer. The operation of the engine, a refined-cycle design with a straight-through gas path and two rotors, is described, the successful certification process is reviewed, and the advantages gained in maintainability through the use of modular design are outlined. The engine also features an integrated inlet-particle separator with an efficiency (on sand) of 95 percent. It is estimated that the CT7-2A can achieve fuel-consumption savings of about 30 percent and maintenance-cost savings of about 45 percent, compared to first-generation engines of similar shaft horsepower (1625 hp on takeoff; maximum normal = 1258 hp) T.K.

A84-11069#

THE T700 - ENGINE FOR THE EIGHTIES AND NINETIES

W. J. WRIGGINS (General Electric Co., Aircraft Engine Business Group, Lynn, MA) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 2. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 16 p.

The 1500-1700-shaft-horsepower T700 turboshaft engine developed for the US Army and currently in use in the UH-60A Black Hawk helicopter is characterized. The design and operation of the integral inlet separator, axial-flow compressor, suction fuel system, modular maintenance structures, and machined ring combustors, are discussed and illustrated. Initial performance data are presented in a table with data from T58 experience, and significant improvements in several 'bottom-line' parameters are found. An advanced engine capable of delivering 25 percent more power is under development. T.K.

A84-11347

SOUND-ABSORBING COMPOSITE STRUCTURES FOR GAS-TURBINE ENGINES [ZVUKOPOGLOSHCHAYUSHCHIE KOMPOZITNYE KONSTRUKTSII DLIYA GAZOTURBINNYKH DVIGATELEY]

N. D. KUZNETSOV, S. I. VESELOV, and G. G. KARTASHOV (Kuibyshevskii Aviatsonnyi Institut, Kuibyshev, USSR) (Vsesoiuznaya Konferentsiya po Mekhanike Polimernykh i Kompozitnykh Materialov, 5th, Riga, Latvian SSR, Oct. 1983) Mekhanika Kompozitnykh Materialov (ISSN 0203-1272), Sept.-Oct. 1983, p. 838-843. In Russian.

In an effort to develop sound-absorbing structures for gas-turbine engines, a study has been made of the acoustic properties, burn-out rate, natural frequency spectra and modes, stressed-strain state, elastic damping, and strength of structures with honeycomb cores of various materials. The possible fracture modes and zones are predicted for sound-absorbing structures under resonance conditions. A comparison is made between sound-absorbing structures of composite materials and titanium. V.L.

A84-11668

COMPRESSION STRUCTURED CERAMIC TURBINE ROTOR CONCEPT

P. J. COTY (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, OH) IN: Ceramics for high-performance applications III: Reliability. New York, Plenum Press, 1983, p. 427-441. refs (Contract F33615-78-C-2041)

In the ceramic gas turbine rotor concept presented, ceramic components are maintained in a state of compression at all operating conditions in order to overcome the problems associated with ceramic refractory materials' brittleness. Many ceramic materials under consideration for gas turbine applications exhibit compressive strengths greater than their tensile values by a factor of 3-8. The present concept uses an air-cooled, high tensile strength composite material containment hoop at the outer diameter of ceramic turbine tip cooling fins, which in turn support the ceramic turbine blades in compression against the turbine wheel. Attention is given to the structural and thermal analyses conducted for this concept, and the prospective performance of the system is compared with that obtainable from a conventional, metallic design. O.C.

A84-11866

NUMERICAL SOLUTION OF COMBUSTOR FLOWFIELDS - A SIMPLE APPROACH

G. H. VATISTAS (Concordia University, Montreal, Canada), S. LIN (Oklahoma State University, Stillwater, OK), C. K. KWOK, and D. G. LILLEY IN: World Congress on System Simulation and Scientific Computation, 10th, Montreal, Canada, August 8-13, 1982, Proceedings. Volume 1. Montreal, International Association for Mathematics and Computers in Simulation, 1983, p. 224-226. refs

It is shown that complex combustor flowfields can be solved with the aid of a relatively simple algorithm. Numerical predictions

of combustor flowfields made by means of a short, simple procedure are presented. Computation results are given depicting the flowfield as velocity vector graphs. The effects of the inlet swirl strength and dilution air on the central recirculation zone's growth and on the overall flowfield development are studied. The results reveal that the solutions for complex flowfields in a combustion chamber with different boundary conditions can be obtained via a considerably simpler algorithm. By using the extended axisymmetrical version of SOLA (Hirt et al, 1975), it is possible to show the effects of complex geometry, inlet swirl strength, and dilution air on the general flow patterns within a combustor C.R.

A84-12043#

A PREDICTION METHOD FOR CHARACTERISTICS OF COOLED TRANSONIC TURBINES WITH LOW ASPECT RATIO AND HIGH LOAD

Y. ZHUANG, Y. ZHAO, J. SHI, and J. HAN (Nanhua Power Plant Research Institute, Nanhua, People's Republic of China) Acta Aeronautica et Astronautica Sinica, vol. 4, June 1983, p 83-93. In Chinese, with abstract in English. refs

A84-12307#

ANALYSIS OF GAS TURBINE ENGINE DYNAMIC INSTABILITIES

R. M. DAVINO (USAF, Flight Test Center, Edwards AFB, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov 16-18, 1983 11 p. (AIAA PAPER 83-2694)

A method has been developed for the analysis of dynamic instabilities that have been observed in gas turbine engines during flight tests. An investigation which exemplifies data analysis techniques was conducted on dynamic data recorded during augmentor transient operation. Signals from pressure transducers located in the engine gas path and fuel delivery system were recorded and digitized. Data analysis techniques included time history plotting of low and high frequency response data, Fourier transform based spectral analysis, and digital filtering. Pre-stall dynamic instabilities were characterized by low frequency oscillations throughout many engine components. The analysis of component interactions identified the path of dynamic instabilities through the engine. A transfer of dynamic energy from one frequency band into another was also identified. Author

A84-12310*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.

FLIGHT EVALUATION RESULTS FOR A DIGITAL ELECTRONIC ENGINE CONTROL IN AN F-15 AIRPLANE

F. W. BURCHAM, JR., L. P. MYERS, and K. R. WALSH (NASA, Flight Research Center, Edwards, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 11 p. refs (AIAA PAPER 83-2703)

A digital electronic engine control (DEEC) system on an F100 engine in an F-15 airplane was evaluated in flight. Thirty flights were flown in a four-phase program from June 1981 to February 1983. Significant improvements in the operability and performance of the F100 engine were developed as a result of the flight evaluation: the augmentor envelope was increased by 15,000 ft, the airstart envelope was improved by 75 knots, and the need to periodically trim the engine was eliminated. The hydromechanical backup control performance was evaluated and was found to be satisfactory. Two system failures were encountered in the test program; both were detected and accommodated successfully. No transfers to the backup control system were required, and no automatic transfers occurred. As a result of the successful DEEC flight evaluation, the DEEC system has entered the full-scale development phase. Author

N84-10053 Ohio State Univ., Columbus.

VIBRATION ANALYSIS OF TURBOMACHINERY BLADES BY SHELL THEORY Ph.D. Thesis

A. J. WANG 1982 193 p

Avail: Univ. Microfilms Order No. DA8305407

Alternate analytical methods are developed that are economical and well suited for parameter studies showing the effects of changing aspect ratio, thickness ratio, shallowness, pretwist, disk radius and angular velocity upon the frequencies and mode shapes. Parameter studies are essential and particularly useful in obtaining a physical understanding of the problem and in preliminary design. The Ritz method, the Reissner's variational principle, the Trefftz method, and a modified lower bound method are investigated. Special attention is given to convergence and bounds. Finally, a numerical approach was introduced to the Ritz method; curvilinear coordinate transformation and shape functions are employed to deal with the complicating factors of variable thickness, variable curvature and nonrectangular shapes of vibrating blades. Comparisons of frequencies and mode shapes between the present approach and the finite element method are made whenever possible. Dissertation Abstr.

N84-10054*# California Univ., Berkeley.

EXPERIMENTAL AND THEORETICAL STUDY OF COMBUSTION JET IGNITION Final Report

D. Y. CHEN, A. F. GHONIEM, and A. K. OPPENHEIM Mar. 1983 138 p refs

(Contract NAG3-131; W-7405-ENG-48; NSF CPE-81-15163)

(NASA-CR-168139; DOE/NASA/O131/1; NAS 1 26.168139)

Avail: NTIS HC A07/MF A01 CSCL 21E

A combustion jet ignition system was developed to generate turbulent jets of combustion products containing free radicals and to discharge them as ignition sources into a combustible medium. In order to understand the ignition and the inflammation processes caused by combustion jets, the studies of the fluid mechanical properties of turbulent jets with and without combustion were conducted theoretically and experimentally. Experiments using a specially designed igniter, with a prechamber to build up and control the stagnation pressure upstream of the orifice, were conducted to investigate the formation processes of turbulent jets of combustion products. The penetration speed of combustion jets has been found to be constant initially and then decreases monotonically as turbulent jets of combustion products travel closer to the wall. This initial penetration speed to combustion jets is proportional to the initial stagnation pressure upstream of the orifice for the same stoichiometric mixture. Computer simulations by Chorin's Random Vortex Method implemented with the flame propagation algorithm for the theoretical model of turbulent jets with and without combustion were performed to study the turbulent jet flow field. In the formation processes of the turbulent jets, the large-scale eddy structure of turbulence, the so-called coherent structure, dominates the entrainment and mixing processes. The large-scale eddy structure of turbulent jets in this study is constructed by a series of vortex pairs, which are organized in the form of a staggered array of vortex clouds generating local recirculation flow patterns. Author

N84-10055*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio

AIRCRAFT ELECTRIC SECONDARY POWER

Washington Jun. 1983 199 p refs Workshop held in Cleveland, 14-15 Sep. 1982

(NASA-CP-2282; E-1632; NAS 1.55:2282) Avail: NTIS HC

A09/MF A01 CSCL 01C

Technologies resulted to aircraft power systems and aircraft in which all secondary power is supplied electrically are discussed. A high-voltage dc power generating system for fighter aircraft, permanent magnet motors and generators for aircraft, lightweight transformers, and the installation of electric generators on turbine engines are among the topics discussed R.J.F.

07 AIRCRAFT PROPULSION AND POWER

N84-10060*# Lockheed-California Co., Burbank.
**PRIMARY ELECTRIC POWER GENERATION SYSTEMS FOR
ADVANCED-TECHNOLOGY ENGINES**

M. J. CRONIN /In NASA. Lewis Research Center Aircraft Elect.
Secondary Power p 51-72 Jun. 1983
Avail: NTIS HC A09/MF A01 CSCL 21E

The advantages of the all electric airplane are discussed. In the all electric airplane the generator is the sole source of electric power; it powers the primary and secondary flight controls, the environmental, and the landing gear. Five candidates for all electric power systems are discussed and compared. Cost benefits of the all electric airplane are discussed. R.J.F.

N84-10061*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
INSTALLATION OF ELECTRIC GENERATORS ON TURBINE ENGINES

H. F. DEMEL /In NASA. Lewis Research Center Aircraft Elect.
Secondary Power p 73-78 Jun. 1983
Avail: NTIS HC A09/MF A01 CSCL 21E

The installation of generators on turbine aircraft is discussed. Emphasis is placed on the use of the samarium cobalt generator. Potential advantages of an electric secondary power system at the engine level are listed. The integrated generator and the externally mounted generator are discussed. It is concluded that the integrated generator is best used in turbojet and low bypass ratio engines where there is no easy way of placing generators externally without influencing frontal areas. R.J.F.

N84-10062*# AiResearch Mfg. Co., Torrance, Calif.
PERMANENT-MAGNET MOTORS AND GENERATORS FOR AIRCRAFT

E. F. ECHOLDS /In NASA. Lewis Research Center Aircraft Elect. Secondary Power p 79-91 Jun. 1983
Avail: NTIS HC A09/MF A01 CSCL 21E

Electric motors and generators that use permanent rotating machinery, but aspects of control and power conditioning are also considered. The discussion is structured around three basic areas: rotating machine design considerations presents various configuration and material options, generator applications provides insight into utilization areas and shows actual hardware and test results, and motor applications provides the same type of information for drive systems. R.J.F.

N84-10063*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

APPLICATION OF ADVANCED MATERIALS TO ROTATING MACHINES

J. E. TRINER /In its Aircraft Elect. Secondary Power p 93-101 Jun. 1983

Avail: NTIS HC A09/MF A01 CSCL 21E

In discussing the application of advanced materials to rotating machinery, the following topics are covered: the torque speed characteristics of ac and dc machines, motor and transformer losses, the factors affecting core loss in motors, advanced magnetic materials and conductors, and design tradeoffs for samarium cobalt motors. B.W.

N84-10070*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio

ALL-PURPOSE BIDIRECTIONAL FOUR-QUADRANT CONTROLLER

I. G. HANSEN /In its Aircraft Elect. Secondary Power p 189-196 Jun. 1983 refs

Avail: NTIS HC A09/MF A01 CSCL 21E

The basic purpose of this paper is to provide some information regarding bidirectional four quadrant resonant power conversion and describe possible applications to aircraft electrical systems. As this technology has been developed sufficiently to demonstrate its feasibility, this is an appropriate time to evaluate the benefits of its application to aircraft electrical systems. Author

N84-10071# California Inst. of Tech., Pasadena. Dept. of Engineering and Applied Science

LINEAR THEORY OF PRESSURE OSCILLATIONS IN LIQUID FUELED RAMJET ENGINES Interim Report

F. E. C. CULICK and V. YANG 1983 9 p refs

(Contract AF-AFOSR-0600-83, AF PROJ. 2308)

(AD-A130882; AFOSR-83-0600TR) Avail: NTIS HC A02/MF A01 CSCL 21B

Low frequency pressure oscillations in ramjet engines are treated within the one dimensional approximation. The engine is treated in two parts: the inlet-section, containing relatively high speed flow, and the combustion chamber. A linearized analysis of a normal shock exposed to acoustic waves provides the upstream boundary condition. Most of the work reported was concerned with the combustion chamber. A simple model of the steady flow in a dump combustor has been worked out, comprising three regions: the flow of unburnt reactions; the region containing products of combustion, and the recirculation zone. Combustion is assumed to occur in an infinitesimally thin sheet; an infinitesimally thin shear layer separates the recirculation zone from the remainder of the flow field. Acoustic fields in the inlet and the combustion chamber are formed separately and joined at the dump plane to provide a transcendental equation for the computer wave number. Results for the frequencies of oscillations and the pressure distributions compare well with experimental data taken at the Naval Weapons Center, China Lake. Some preliminary results are given for the unsteady behavior of a normal shock wave in a diffuser, calculated with a modified form of a computer program obtained from AFRPL. GRA

N84-10072# Naval Postgraduate School, Monterey, Calif. Dept. of Operations Research.

THE CEMS (COMPREHENSIVE ENGINE MANAGEMENT SYSTEM) IV OAP (OIL ANALYSIS PROGRAM) ALGORITHM

H. J. LARSON and T. JAYACHANDRAN May 1983 30 p refs
(AD-A131055; NPS55-83-013) Avail: NTIS HC A03/MF A01 CSCL 12K

The Comprehensive Engine Management System (CEMS) Phase 4, will provide real time data analysis capability for all Air Force oil analysis laboratories. This paper describes the statistical algorithm used by this system to aid the oil analysis technician in making his recommendations. The algorithms incorporate usage and oil consumption variables, and employs least squares to minimize the effects of the random errors in the spectrometer readings. Author (GRA)

N84-10073# Iowa State Univ. of Science and Technology, Ames. Turbomachinery Components Research Program.

AERODYNAMICS OF ADVANCED AXIAL-FLOW TURBOMACHINERY Final Report, 1 Oct. 1980 - 30 Nov. 1982

G. K. SEROVY, P. KAVANAGH, and T. H. OKIISHI Feb. 1983 73 p refs

(Contract AF PROJ. 2307)

(AD-A131360; TCRL-23; AFOSR-81-0004TR) Avail: NTIS HC A04/MF A01 CSCL 21E

A multi-task research program on the aerodynamics of advanced axial-flow turbomachinery was completed at Iowa State University. Program components were intended to result in direct contributions to the improvement of axial-flow fan, compressor, and turbine design procedures. A detailed experimental investigation of intrapassage flow in a large-scale, curved, rectangular cross-section channel representative of turbomachinery passages was carried out. The use of stator geometry modification to improve stage performance through better secondary flow control was investigated via laboratory tests of baseline and modified version of a two-stage compressor. Aerodynamic variables which influence surface boundary layer development in compressor and turbine airfoil cascades were restudied in order to determine sources of differences between linear cascade performance and performance of equivalent cascade geometries in multistage turbomachine blade rows. GRA

N84-10074# Battelle Columbus Labs, Ohio
TURBINE ENGINE EXHAUST HYDROCARBON ANALYSIS, TASKS 1 AND 2 Interim Report, Jan. - Sep. 1982
 D. A. BERRY, M. W. HOLDREN, T. F. LYON, R. M. RIGGIN, and C. W. SPICER Tyndall AFB, Fla. AFESC Jun. 1983 83 p refs
 (Contract F08635-82-C-0131; AF PROJ. 1900)
 (AD-A131522; AFESC/ESL-TR-82-43) Avail: NTIS HC A05/MF A01 CSCL 21B

The environmental impact of organic compounds emitted from jet aircraft turbine engines has not been firmly established, due to the lack of data regarding the emission rates and identities of the compounds. The objective was to identify and quantify the organic compounds present in gaseous emissions from jet engines and to study the photochemical behavior of these compounds. This interim report describes the experimental work performed for Task 1 (sampling and analysis method validation) and Task 2 (combustor rig testing), wherein a variety of sensitive and reliable methods were developed and evaluated for the determination of the wide range of compounds likely to be emitted from jet engines. Tasks 3-5 will be performed between April and September, 1983. At that time emissions from full-scale jet engines can be characterized in terms of chemical composition and photochemical reactivity using a variety of fuels and operating conditions. GRA

N84-10075# California Inst. of Tech., Pasadena Dept. of Engineering and Applied Science.
LINEAR THEORY OF PRESSURE OSCILLATIONS IN LIQUID-FUELED RAMJET ENGINES Interim Report
 V. YANG and F. E. C. CULICK Jan. 1983 16 p refs Presented at the 21st Meeting of the AIAA Aerospace Sci., Reno, Nev., 10-13 Jan. 1983
 (Contract AF-AFOSR-0265-80, AF PROJ. 2308)
 (AD-A131610; AFOSR-83-0649TR) Avail: NTIS HC A02/MF A01 CSCL 21B

Pressure oscillations in ramjet engines are studied within quasi-one dimensional linear acoustics. The flow field in the dump combustor is approximated by division into three parts: a flow of reactants, a region containing combustion products, and a recirculation zone, separated by a flame sheet and a dividing streamline. The three zones are matched by considering kinematic and conservative relations. Acoustic fields in the inlet section and in the combustion chamber are coupled to provide an analytical equation for the complex wave number characterizing the linear stability. GRA

N84-10076# Pratt and Whitney Aircraft, West Palm Beach, Fla. Government Products Div.
X-RAY WEAR METAL MONITOR Final Report, Dec. 1981 - Dec. 1982
 L. L. PACKER Wright-Patterson AFB, Ohio AFWAL May 1983 42 p refs
 (Contract F33615-81-C-2065, AF PROJ. 3048)
 (AD-A131251, AFWAL-TR-83-2029; PWA/GPD-FR-16823) Avail: NTIS HC A03/MF A01 CSCL 21E

The objective of this program was a laboratory investigation to study and define the operating parameters and basic equipment requirements of an X-ray fluorescence wear metal monitor system. Specifically, the work has defined the controlling factors of the wear metal detection sensitivity for iron, copper, silver and titanium. The safety and regulatory requirements involved in the use of radioactive materials were also examined. GRA

N84-11123# De Havilland Aircraft Co. of Canada Ltd., Downsview (Ontario).
AEROELASTIC DESIGN CONSIDERATIONS FOR TURBOPROP POWERPLANT INSTALLATIONS
 J. J. GLASER In AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 18 p Sep 1983 refs Sponsored in part by Dept. of National Defence and National Research Council of Canada
 Avail: NTIS HC A14/MF A01

Experience gained in designing turboprop powerplant suspension systems to minimize vibrations resulting from propeller unbalance is discussed. An overview is first given of turboprop suspension considerations including whirl flutter, vibration isolation and landing loads. This is followed by an outline of the design evolution of the DHC-7 suspension system proven successful in service. The design features of the DHC-8 system, currently under development, are also prepared. Recommendations pertinent to preliminary design and development are given. R.J.F.

N84-11170*# General Electric Co., Evendale, Ohio. Aircraft Engine Business Group.
ENERGY EFFICIENT ENGINE: FLIGHT PROPULSION SYSTEM, PRELIMINARY ANALYSIS AND DESIGN UPDATE Topical Report, Nov. 1978 - Jul. 1982
 E. M. STEARNS Nov. 1982 61 p refs
 (Contract NAS3-20643)
 (NASA-CR-167980; NAS 1.26:167980, R82AEB532) Avail: NTIS HC A04/MF A01 CSCL 21E

The preliminary design of General Electric's Energy Efficient Engine (E3) was reported in detail in 1980. Since then, the design has been refined and the components have been rig-tested. The changes which have occurred in the engine and a reassessment of the economic payoff are presented in this report. All goals for efficiency, environmental considerations, and economic payoff are being met. The E3 Flight Propulsion System has 14.9% lower sfc than a CF6-50C. It provides a 7.1% reduction in direct operating cost for a short haul domestic transport and 14.5% reduction for an international long distance transport. Author

N84-11171*# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
F100 MULTIVARIABLE CONTROL SYNTHESIS PROGRAM. COMPUTER IMPLEMENTATION OF THE F100 MULTIVARIABLE CONTROL ALGORITHM
 J. F. SOEDER Oct. 1983 46 p
 (NASA-TP-2231, E-1496, NAS 1.60:2231) Avail: NTIS HC A03/MF A01 CSCL 21E

As turbofan engines become more complex, the development of controls necessitate the use of multivariable control techniques. A control developed for the F100-PW-100(3) turbofan engine by using linear quadratic regulator theory and other modern multivariable control synthesis techniques is described. The assembly language implementation of this control on an SEL 810B minicomputer is described. This implementation was then evaluated by using a real-time hybrid simulation of the engine. The control software was modified to run with a real engine. These modifications, in the form of sensor and actuator failure checks and control executive sequencing, are discussed. Finally recommendations for control software implementations are presented. SL

N84-11172# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
JOURNAL OF ENGINEERING THERMOPHYSICS (SELECTED ARTICLES)
 20 May 1983 89 p refs Transl into ENGLISH from Gongcheng Rewuli Xuebao (China), v. 2, no. 2, 1981 p 106-110, 121-144, 160-172 and 185-187
 (AD-A129432; FTD-ID(RS)T-0377-83) Avail: NTIS HC A05/MF A01 CSCL 21E

Optical cycle parameters of turbofan engines with equal total pressure mixing exhaust, transonic cascade flow field circulation, a twin shaft turbojet engine, a transonic compresses, multistage

07 AIRCRAFT PROPULSION AND POWER

turbines, and axial flow compressors, thermal conductivity are discussed. N.W.

N84-11173# Mathematical Sciences Northwest, Inc., Bellevue, Wash.

INVESTIGATION OF WATER ROTOR TURBOFANS FOR CRUISE MISSILE ENGINES, VOLUME 2 Final Report

R. TAUSSIG and P. CASSADY Apr. 1983 51 p refs 2 Vol. (Contract N00140-82-C-9729; DARPA ORDER 4361) (AD-A131168; MSNW-13 213.01.70-VOL-2) Avail: NTIS HC A04/MF A01 CSCL 21E

The history of wave rotor applications to aircraft turbine engines is reviewed in order to determine the reasons for past successes and failures. The results show that two different kinds of wave rotors performed successfully in laboratory tests in the mid-1950s and late 1960s. These were the Pearson wave rotor/turbine built and tested by Ruston Hornsby in England and the Complex pressure exchange wave rotor built by the Brown-Boveri Company and tested by the Rolls-Royce Company. With the advent of advanced gasdynamic numerical simulation techniques embodied in an experimentally verified computer flow code for wave rotors, the prospect of upgrading these earlier wave rotor designs for a modern high temperature, high pressure aircraft turbofan engine looks very attractive. The flow code would allow very rapid design optimization and cut down the time and costs for successful engine development. A suitable niche for the initial application of wave rotor turbofans has appeared in the area of small, low-TSFC engines; wave rotors may also allow better cruise conditions for high performance engines. Author (GRA)

N84-11174# Mathematical Sciences Northwest, Inc., Bellevue, Wash.

INVESTIGATION OF WAVE ROTOR TURBOFANS FOR CRUISE MISSILE ENGINES, VOLUME 1 Final Report

R. TAUSSIG, P. CASSADY, J. ZUMDIECK, W. THAYER, E. KLOSTERMAN, R. MILROY, and R. KLUG Apr. 1983 135 p 2 Vol. (Contract N00140-82-C-9729, DARPA ORDER-4361) (AD-A131167; MSNW-13.213.01.70-VOL-1) Avail: NTIS HC A07/MF A01 CSCL 21E

Wave rotors have been investigated as a technology for improving the performance of small turbofan engines in the 600 to 1000 lb. thrust class. This report summarizes the results of an eight-month study to analyze wave rotor performance for different configurations and to determine its sensitivity to operating and design parameters. Engine cycle calculations were also performed in order to estimate engine performance improvements and sensitivity to the wave rotor component. Wave rotor/turbines and pressure exchanger wave rotors both have been evaluated. In each case, experimental data exists which confirms predicted wave rotor performance over a wide range of operating conditions. GRA

N84-11175# Rocket Research Corp., Redmond, Wash.
HYDRAZINE APU STARTER DEVELOPMENT Final Report, Mar. 1978 - Mar. 1983

D. A. PAHL Wright-Patterson AFB, Ohio AFWAL Jun. 1983 169 p refs (Contract F33615-78-C-2003; AF PROJ. 3145) (AD-A131575; AFWAL-TR-83-2039; RRC-83-4-905) Avail: NTIS HC A08/MF A01

The purpose of this program was to develop a hot gas vane motor that would have application to advanced aircraft APU starting. Over the course of the program, the motor design evolved to the point that -65 degrees F starts, hot restarts above 130 degrees F, and multiple starts without refurbishment were possible. Analytical studies evaluated concepts for reducing motor internal friction. Author (GRA)

08

AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

A84-10486

THE DYNAMICS OF VEHICLES WITH TWO-CHANNEL GUIDANCE [DINAMIKA APPARATOV S DVUKHKANAL'NYM UPRAVLENIEM]

V. K. SVIATODUKH and P. M. CHERNIAVSKII Moscow, Izdatel'stvo Mashinostroenie, 1983, 160 p. In Russian. refs

An analysis is made of the three-dimensional motion about the center of mass of guided axisymmetrical flight vehicles that are not provided with an angle-of-roll control channel. Conditions are determined for various forms of motion, and a mathematical model is developed which treats the flight vehicle as a rigid body. The effect of various factors (e.g., cross coupling, geometrical asymmetry of the vehicle, and the magnitude of perturbations) on the dynamics of the flight vehicle is analyzed qualitatively. V.L.

A84-10566#

INVESTIGATIONS OF THE FLIGHT CHARACTERISTICS OF AIRLINERS WITH REDUCED STATIC LONGITUDINAL STABILITY [FLUGEIGENSCHAFTSUNTERSUCHUNGEN VON VERKEHRSFLUGZEUGEN MIT REDUZIERTER STATISCHER LAENGSSSTABILITAET]

K. WILHELM, D. SCHAFFRANEK (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick, West Germany), and B. TROSKY (Messerschmitt-Boelkow-Blohm GmbH, Unternehmensbereich Transportflugzeuge, Hamburg, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov. 11, 12, 1982. 21 p. In German. refs (DGLR PAPER 82-091)

An experimental program was conducted with the aim to study the effect of a reduced longitudinal stability on the flight characteristics. An A300 training simulator and an in-flight simulator were employed in the investigations. Attention is given to the dynamic characteristics of the aircraft, aspects of ground simulation, questions of in-flight simulation, the procedures used to evaluate the flight characteristics, climbing characteristics, cruising flight, and approach and landing. The reported investigations had the objective to evaluate the flight characteristics of transport aircraft under conditions of instability or reduced stability, taking into account a failure regarding the stabilization control system and the functions of the flight augmentation computer. G.R.

A84-10567#

REALIZATION OF REDUCED STABILITY IN A MODERN TRANSPORT AIRCRAFT BY CONTROLLING THE CENTER OF GRAVITY [VERWIRKLICHUNG REDUZIERTER STABILITAET IN EINEM MODERNEN VERKEHRSFLUGZEUG DURCH SCHWERPUNKTSREGELUNG]

A. KROEGER (Messerschmitt-Boelkow-Blohm GmbH, Unternehmensbereich Transportflugzeuge, Hamburg, West Germany) Deutsche Gesellschaft fuer Luft- und Raumfahrt, Symposium ueber Leistungssteigerungen bei Flaechenflugzeugen, Frankfurt am Main, West Germany, Nov. 11, 12, 1982. 32 p. In German. (DGLR PAPER 82-092)

Modifications to the A310 aircraft to increase its effective weight and range by shifting its center of gravity to the rear (and thus reducing drag) are proposed on the basis of design studies and computer simulations. A computer-regulated 4000-kg trim tank in the elevator, linked by lines to the main fuel system, is shown to be capable of shifting the center of gravity during flight by 10-15 percent MAC; increasing the takeoff weight from 138.6 to 149 tons and using the extra fuel capacity of the trim-tank system, the

range of the A310 could be increased from 3150 to 3700 nm. Minor modifications in the flight augmentation computer allow the autopilot to take over control of the aircraft during destabilized flight. T.K.

A84-10575#

TACTICAL FLIGHT MANAGEMENT SYSTEM DESIGN

J. F. KLAFFIN (Grumman Aerospace Corp., Flight Control Systems Section, Bethpage, NY) American Institute of Aeronautics and Astronautics, Aircraft Design, Systems and Technology Meeting, Fort Worth, TX, Oct. 17-19, 1983. 14 p. refs (AIAA PAPER 83-2559)

The present investigation is concerned with the effect of the advances in digital computational capability and systems integration technology on the vehicle flight control design function, taking into account a conceptual, highly automated, Flight Management System (FMS) for a tactical aircraft. Attention is given to a general design approach, the characteristics of the flight management system, aspects of trajectory management, safety management, FMS requirements, FMS safety, FMS partitioning, integrated sensor configurations, aspects of actuation system technology, integrated flight/propulsion control, and integrated flight/fire control G.R.

A84-10907

IMPROVED OPERATIONAL TECHNIQUES IN THE SIMULATION OF A MISSILE AUTOPILOT

Y. K. CHANG (Ministry of Defence, Singapore) and P. V. RAO (National University of Singapore, Singapore) IN: Annual Simulation Symposium, 16th, Tampa, FL, March 16-18, 1983, Record of Proceedings. Silver Spring, MD, IEEE Computer Society Press, 1983, p. 239-251. refs

Although classical simulation techniques can provide very accurate digital simulation of continuous systems, they are not suited for the real time solution of complex systems. The present investigation is, therefore, concerned with the feasibility to employ faster operational methods for applications involving complex systems. Aspects of problem formulation are discussed, taking into account a model of a single axis (yaw) autopilot of a rear controlled missile, and the use of the modified Adam Bashforth Predictor Corrector (MABPC), and the Kutta Simpson Runge Kutta Fourth Order (RK4) techniques as a check regarding the accuracy of the simulation. Attention is given to the transformation to Z-domain, the digital compensator, and a performance index definition. G.R.

A84-11046*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va.

TRIMMING ADVANCED FIGHTERS FOR STOL APPROACHES

J. W. PAULSON, JR., G. M. GATLIN, P. F. QUINTO, and D. W. BANKS. (NASA, Langley Research Center, Low-Speed Aerodynamics Div., Hampton, VA) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 957-962. refs

Previously cited in issue 05, p. 598, Accession no. A83-16566

A84-11062#

MISSION-SPECIFIC EFFECTS ON HELICOPTER FLIGHT MECHANICS [MISSIONSSPEZIFISCHE EINFLUESSE AUF DIE HUBSCHRAUBER-FLUGMECHANIK]

P. G. HAMEL, B. L. GMELIN, and H.-J. PAUSDER (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Flugmechanik, Brunswick, West Germany) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 1. Hanover, West Germany, Deutsche Messe- und Ausstellungs-AG, 1983, 27 p. In German refs

It has been found that the evaluation of the flight characteristics of a helicopter depends to a large degree on the mission which has to be conducted. Questions can, for instance, arise regarding the design of criteria concerning the helicopter flight characteristics for a successful mission involving the defense against tanks. The present investigation has the objective to report the results of flight tests which had been conducted to determine the mission-oriented flight properties of helicopters. The obtained data

provide a contribution to a data bank which has recently been established in West Germany as a basis for the derivation of guidelines regarding the flight characteristics of future helicopters. G.R.

A84-11170

AN ANALYTICAL STUDY OF THE INDUCED DRAG OF CANARD-WING-TAIL AIRCRAFT CONFIGURATIONS WITH VARIOUS LEVELS OF STATIC STABILITY

G. F. BUTLER (Royal Aircraft Establishment, Flight Systems Dept., Farnborough, Hants., England) Aeronautical Journal (ISSN 0001-9240), vol. 87, Oct. 1983, p. 293-300. refs

The prospect of reducing the induced drag of an aircraft by using both a canard and tailplane for trimming is investigated and results are compared with those for conventional tail-aft and canard arrangements. It is concluded that improvements of approximately 20 percent in lift-drag ratio are theoretically possible at high lift coefficients by the use of an additional trimming surface. Author

A84-11939

REAL-TIME, ON-LINE AUTOMATIC GUIDANCE AND CONTROL FLIGHT SIMULATION

C.-F. LIN (Michigan University, Ann Arbor, MI) IN: World Congress on System Simulation and Scientific Computation, 10th, Montreal, Canada, August 8-13, 1982, Proceedings. Volume 3. Montreal, International Association for Mathematics and Computers in Simulation, 1983, p. 239-241. refs

This paper summarizes results of real-time, online automatic guidance and control flight simulation of a wide range of supersonic aircraft maneuvers. These maneuvers include maximum-range glide, minimum-time zoom climb, minimum-time loop, half-loop and split-S, and minimum-time three-dimensional turn. Both off-line optimization and on-line optimization approaches are used in the simulation. Author

A84-11998

DYNAMICS OF LONGITUDINAL MOTION OF AN AEROPLANE WITH A DEFORMABLE CONTROL SYSTEM

Z. DZYGADLO and A. KRZYZANOWSKI Journal of Technical Physics (ISSN 0324-8313), vol. 23, no. 3-4, 1982, p. 323-341. refs

The longitudinal motion of an airplane with a deformable control system and a ponderable elevator is analyzed dynamically. The model is defined, and a set of nonlinear ordinary differential equations describing the longitudinal dynamics as functions of initial-perturbation amplitudes is derived which accounts for the elasticity and damping of the control system and the unbalance of the elevator. A Runge-Kutta-Gill numerical-integration algorithm is applied; the results are presented graphically for different flight conditions of a TS-11 Iskra jet trainer and discussed. D.G.

A84-12332#

OVERCONTROLLING, RESIDUAL OSCILLATIONS, PIO, A FEATURE OF HIGH ORDER, HIGH GAIN, FLIGHT CONTROL SYSTEMS

J. STARKE (Messerschmitt-Boelkow-Blohm GmbH, Munich, West Germany) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983 9 p. (AIAA PAPER 83-2740)

Examples are given of pilot-induced oscillation (PIO) observed in recent years with modern high-gain, high-order control systems. These situations were caused by transients and system change-overs or by pilot overreaction upon such transients. They were encountered without any warning in flight regimes thought to be PIO-resistant. Consideration is given to PIO in linear and non-linear systems, PIO due to misleading pilot cue, and PIO due to excessive pilot gain. The importance of checking all flight controls and all pilot cues for possible nonlinearities is stressed. These nonlinearities include freeplay (mechanical or electrical), aerodynamic nonlinearities, feedback limitations, and nonlinearities due to system saturation C.R.

A84-12492#

SOME EFFECTS OF HIGH-RATE SPRINGS IN ELEVATOR CONTROL SYSTEMS

M. E. ESHELBY (Cranfield Institute of Technology, Cranfield, Beds., England) *Journal of Guidance, Control, and Dynamics* (ISSN 0731-5090), vol. 6, Nov.-Dec. 1983, p. 531-533.

The controls-free longitudinal static stability of an aircraft with manual flying controls can be increased simply and inexpensively by installing a nose-down spring in the elevator control circuit. The spring increases the slope of the trim curve of the elevator hinge moment to trim against the lift coefficient. Ideally, it should be equally effective throughout the speed range of the aircraft and should not vary markedly with airframe configuration changes or center of gravity location. This can be achieved by using a low-rate spring, such as a bungee cord, so that minor changes in its length will not materially affect the spring load. To attain the necessary datum spring load, a low-rate spring will have to be extended to a considerable length, a length that may be too great for convenient installation in an aircraft. For this reason, shorter, high-rate springs must be used, and the resulting secondary contributions are described here. C.R.

A84-12493#

COMMENT ON 'LOW-ORDER APPROACHES TO HIGH-ORDER SYSTEMS PROBLEMS AND PROMISES'

C. R. CHALK (Arvin/Calspan Advanced Technology Center, Buffalo, NY) *Journal of Guidance, Control, and Dynamics* (ISSN 0731-5090), vol. 6, Nov.-Dec. 1983, p. 534-536. refs

N84-10077 Virginia Polytechnic Inst. and State Univ., Blacksburg.

A DYNAMIC MODEL FOR AIRCRAFT POSTSTALL DEPARTURE Ph.D. Thesis

M. A. HREHA 1982 134 p

Avail: Univ. Microfilms Order No. DA8304113

An engineering model designed for the analysis of high angle of attack flight characteristics is developed and applied to the problem of aircraft poststall departure. The model consists of an aerodynamics package used interactively with a six degree of freedom flight simulator. The aerodynamics are computed via a nonlinear lifting line theory with unsteady wake effects due to a discrete, nonplanar vortex system. A fully configured aircraft (main wing, horizontal tail and vertical fin) is mathematically constructed by modeling all lifting surfaces with bound, discrete vortex segments and associated control points, vehicle geometric influence on high angle of attack flight characteristics is included through complete variability in the relative locations, orientations and sizes of the flight surfaces. This aircraft model is flown through prescribed maneuvers by integrating the equations of motion. Selected results of trajectory simulations presented for a typical general aviation aircraft provide the following insights to wing drop departure subsequent to stall. Dissert. Abstr.

N84-10078*# Information and Control Systems, Inc., Hampton, Va

ATOPS B-737 INNER-LOOP CONTROL SYSTEM LINEAR MODEL CONSTRUCTION AND VERIFICATION Interim Report

J. R. BROUSSARD Feb 1983 65 p refs

(Contract NAS1-15759)

(NASA-CR-166055; NAS 1 26:166055; TR-682101) Avail: NTIS HC A04/MF A01 CSCL 01C

Nonlinear models and block diagrams of an inner-loop control system for the ATOPS B-737 Research Aircraft are presented. Continuous time linear model representations of the nonlinear inner-loop control systems are derived. Closed-loop aircraft simulations comparing nonlinear and linear dynamic responses to step inputs are used to verify the inner-loop control system models. Author

N84-10079*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

APPLICATION OF AN ADAPTIVE BLADE CONTROL ALGORITHM TO A GUST ALLEVIATION SYSTEM

S. SAITO Sep 1983 32 p refs

(NASA-TM-85848; A-9497; NAS 1.15:85848) Avail: NTIS HC A03/MF A01 CSCL 01C

The feasibility of an adaptive control system designed to alleviate helicopter gust induced vibration was analytically investigated for an articulated rotor system. This control system is based on discrete optimal control theory, and is composed of a set of measurements (oscillatory hub forces and moments), an identification system using a Kalman filter, a control system based on the minimization of the quadratic performance function, and a simulation system of the helicopter rotor. The gust models are step and sinusoidal vertical gusts. Control inputs are selected at the gust frequency, subharmonic frequency, and superharmonic frequency, and are superimposed on the basic collective and cyclic control inputs. The response to be reduced is selected to be that at the gust frequency because this is the dominant response compared with sub- and superharmonics. Numerical calculations show that the adaptive blade pitch control algorithm satisfactorily alleviates the hub gust response. Almost 100% reduction of the perturbation thrust response to a step gust and more than 50% reduction to a sinusoidal gust are achieved in the numerical simulations. Author

N84-10080# Rockwell International Corp., Los Angeles, Calif. Aircraft Operations Div.

AIRPLANE ACTUATION TRADE STUDY Final Report, 25 Jun. 1979 - 1 Jul. 1982

C. W. HELSLEY Jan. 1983 383 p refs

(Contract F33615-79-C-3615, AF PROJ. 2403)

(AD-A130709; AFWAL-TR-82-3108; NA-79-492-2) Avail: NTIS HC A17/MF A01 CSCL 01C

This report contains the results of the Airplane Actuation Trade Study Program. The study, conducted in three phases, included establishment of actuation requirements; design of two airplanes (a baseline airplane and an all-electric airplane) and a trade study of the two airplanes plus several minor variants. The trade study includes quantitative comparison data relative to weight, reliability, maintainability, and life cycle cost. The study results indicate that the All-Electric approach did not provide a viable alternative to the more conventional Hydraulic Electric approach as these approaches would be developed and applied to aircraft of the mid-1990 time period. Author (GRA)

N84-10081# Aeronautical Research Labs., Melbourne (Australia)

GUST RESPONSE OF A LIGHT, SINGLE-ENGINED, HIGH-WING AIRCRAFT

C. J. LUDOWYK Jan. 1983 49 p refs

(AD-A131033; ARL/AERO-TM-345) Avail: NTIS HC A03/MF A01 CSCL 20D

A recently developed FORTRAN program for calculating rigid-aircraft gust response has been applied to obtain longitudinal and lateral transfer functions and output response spectra for a general aviation, high wing aircraft. GRA

N84-10082# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

SPECIAL COURSE ON AERODYNAMIC CHARACTERISTICS OF CONTROLS

Jul 1983 254 p refs Course held in Rhode-Saint-Genese, Belgium, 21-25 Mar. 1983

(AGARD-R-711; ISBN-92-835-1457-2) Avail: NTIS HC A12/MF A01

The aerodynamic characteristics of aircraft control surfaces and methods for theoretical and experimental analysis of those characteristics are discussed. Direct force controls, device actuation, and unsteady and oscillatory controls are addressed. Some consideration is also given to missile controls.

N84-10083# Queen Mary Coll., London (England). Dept. of Aeronautical Engineering.

INTRODUCTORY REMARKS AND REVIEW OF 1979 SYMPOSIUM

A. D. YOUNG /in AGARD Spec. Course on Aerodyn. Characteristics of Controls 7 p Jul. 1983 refs
 Avail: NTIS HC A12/MF A01

A brief historical review of aircraft controls is given. The impact of recent technological development, novel controls, and the status of predictive theories and experimental techniques are also addressed. M.G.

N84-10084# Thomas (H. H. B. M.), Farnborough (England).

THE AERODYNAMICS OF AIRCRAFT CONTROL: A GENERAL SURVEY IN THE CONTEXT OF ACTIVE CONTROL TECHNOLOGY

H. H. B. M. THOMAS /in AGARD Spec. Course on Aerodyn. Characteristics of Controls 40 p Jul. 1983 refs
 Avail: NTIS HC A12/MF A01

The introduction of active control technology into the design of aircraft was accompanied by the use of additional control devices or motivators and an expansion in the uses to which existing motivators are put, either individually or in combination with each other or one of the novel forms of control. A general survey is made of the different properties such as maximum control powers, effectiveness generally, and to some extent the actuating moments as is an assessment of their relative importance in different contexts. The present data base available to the aircraft designer from different sources is examined in some detail with particular attention to identifying the direct and indirect effects. Particular emphasis is placed on the efficiency of the motivator at extreme flight conditions, characterized by high angle of attack and high subsonic speeds. Author

N84-10085# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. for Design-Aerodynamics

MATHEMATICAL MODELLING AND THEORETICAL METHODS FOR THE AERODYNAMIC BEHAVIOUR OF CONTROL DEVICES

H. KORNER /in AGARD Spec. Course on Aerodyn. Characteristics of Controls 23 p Jul. 1983 refs
 Avail: NTIS HC A12/MF A01

A survey of the theoretical aerodynamic aspects of control devices is given. This is done for subsonic, transonic and supersonic attached flow; some comments on separated flow are also given. The basic flow equations are introduced and various calculation methods based on these equations are reviewed. This is followed by a comparison between theoretical and experimental results. Author

N84-10086# Queen Mary Coll., London (England). Dept. of Aeronautical Engineering.

DYNAMIC EFFECTS OF CONTROLS

G. J. HANCOCK /in AGARD Spec. Course on Aerodyn. Characteristics of Controls 19 p Jul. 1983 refs
 Avail: NTIS HC A12/MF A01

Some of the background concepts and methods underlying the interface of aerodynamics and dynamics are outlined. The topics discussed include: (1) qualitative descriptions of the unsteady aerodynamic characteristics associated with the movement of control surfaces (trailing edge controls, leading edge controls, spoilers) at various Mach numbers; (2) a summary of the methods of prediction of unsteady control surface aerodynamics, (3) a preliminary indication of comparisons between results from theory and experiment, (4) the concept of aerodynamic derivatives; and (5) the interface between aerodynamics and dynamics. M.G.

N84-10087# Royal Aircraft Establishment, Bedford (England). Aerodynamics Dept.

EXPERIMENTAL METHODS TO DETERMINE CONTROL EFFECTIVENESS IN WIND TUNNELS

D. G. MABEY /in AGARD Spec. Course on Aerodyn. Characteristics of Controls 18 p Jul. 1983 refs
 Avail: NTIS HC A12/MF A01

The methods used to determine control effectiveness in wind tunnels are reviewed using illustrative examples. Major experimental difficulties are enumerated. The controls discussed include tailplanes, ailerons, airbrakes and spoilers. Both steady and unsteady measurements are considered, although the emphasis is on unsteady measurements and transonic speeds. As an illustration of the current interest in active control technology, some results from an experiment are included in which a trailing edge flap is driven 'closed loop' to reduce the response of a model wing to flow unsteadiness. M.G.

N84-10088# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

CONTROL OF THE FOREBODY VORTEX ORIENTATION BY ASYMMETRIC AIR INJECTION. PART A: APPLICATION TO ENHANCE DEPARTURE/SPIN RECOVERY OF FIGHTER AIRCRAFT AND PART B: DETAILS OF THE FLOW STRUCTURE

A. M. SKOW (Northrop Corp., Hawthorne, Calif.) and D. J. PEAKE /in AGARD Spec. Course on Aerodyn. Characteristics of Controls 22 p Jul. 1983 refs
 Avail: NTIS HC A12/MF A01

A concept developed to provide powerful directional control effectiveness for a fighter aircraft at high angles of attack is described. The concept utilizes the energy concentrated in the strong forebody vortices (which form on slender bodies of high relative incidence) by controlling the lateral orientation of the vortices with respect to the body. The objective was to utilize the side force associated with asymmetric vortices, in a controlled manner, to enhance the ability of the fighter to recover from a departure from controlled flight. The results from water tunnel and wind tunnel experiments show that a small amount of tangential blowing along the forebody near the apex can effectively alter the forebody vortex system and generate large restoring yawing moments. Six degree of freedom digital simulation results show that this concept can substantially enhance recovery characteristics of fighter aircraft with long, slender forebodies. Also, the results of experiments which were conducted on a cone model are discussed where the principal test objective was to develop an understanding of the fluid mechanics involved in the process of vortex control. Knowledge gained in these more generic tests should allow the concept to be applied to a wider range of configurations. M.G.

N84-10089# Northrop Corp., Hawthorne, Calif. Aircraft Div.

CONTROL OF ADVANCED FIGHTER AIRCRAFT

A. M. SKOW /in AGARD Spec. Course on Aerodyn. Characteristics of Controls 31 p Jul. 1983
 Avail: NTIS HC A12/MF A01

An overview of traditional and projected control technologies for fighter aircraft is presented. Basic aerodynamic effectiveness and control criteria are examined and controversies regarding tail location and angle of attack limiting are discussed. Future research directions are described including thrust vectoring, control implications of new air combat maneuvering tactics, ultra-fast actuators, and novel controls. M.G.

N84-10090# Hochschule der Bundeswehr, Munich. (West Germany).

DIRECT FORCE CONTROL

G. SACHS /in AGARD Spec. Course on Aerodyn. Characteristics of Controls 17 p Jul. 1983 refs
 Avail: NTIS HC A12/MF A01

Direct force control provides novel and unique motion capabilities of the aircraft due to independent control of flight path and altitude. In addition, flight path response characteristics

08 AIRCRAFT STABILITY AND CONTROL

can be speeded up. For direct lift control, it is shown how these novel capabilities may be utilized, with a discussion of possible deficiencies of conventional elevator control added for comparison. The aerodynamic characteristics of direct lift devices are described. This concerns not only lift but also drag characteristics which may be of significance for the long term response of the aircraft (flight path stability). For direct side force control, the novel motion capabilities possible are shown. This is followed by a description of the aerodynamic force characteristics of control surfaces applicable for direct side force control. In addition, coupling effects are discussed as well as effects on stability. In regard to direct drag control, some basic aspects concerning control surfaces and deceleration levels achievable are described. Author

N84-10091# Cranfield Inst. of Tech., Bedfordshire (England) Coll. of Aeronautics.

EXPERIMENTAL METHODS IN FLIGHT FOR THE MEASUREMENT OF CONTROL CHARACTERISTICS

M. E. ESHELBY *In* AGARD Spec. Course on Aerodyn Characteristics of Controls 17 p Jul. 1983 refs Avail: NTIS HC A12/MF A01

Although the measurement of control characteristics is relatively simple in the wind tunnel their flight measurement is not so straightforward. In general the control characteristics are implicit in the measurement of the handling qualities of the aircraft and do not appear as separately measured quantities. It is, however, possible to extract some data on control characteristics from the handling qualities trials; some methods of their assessment are considered. Principally the longitudinal control characteristics can be determined from static stability trials whereas the lateral directional control characteristics are derived from dynamic tests. Special trials in respect of aircraft flying beyond their normal limitations are discussed. Methods of handling qualities assessment are also considered since these encompass the control characteristics of the aircraft. Author

N84-10092# Nielsen Engineering and Research, Inc., Mountain View, Calif.

AERODYNAMIC CHARACTERISTICS OF MISSILE CONTROLS

J. N. NIELSEN *In* AGARD Spec. Course on Aerodyn. Characteristics of Controls 53 p Jul. 1983 refs Avail: NTIS HC A12/MF A01

Missile types and terminology are reviewed. The subjects of jet spoilers and combining controls and the airframe are considered. As the basic approach to integrating the presentation of all movable controls, the equivalent angle of attack concept is next taken up followed by detailed considerations of all movable planar and cruciform controls. These are treated from the phenomenological point of view as well as from the quantitative point of view. Methods of determining the effects of vortices on control characteristics are presented in sufficient detail to carry out calculations. Final control hinge moments and a preliminary method for their calculation at supersonic speed are discussed. Author

N84-10093# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

COMPUTER-AIDED DESIGN AND ANALYSIS OF DIGITAL GUIDANCE AND CONTROL SYSTEMS

Jul. 1983 137 p refs Lecture held in Stuttgart, 8-9 Sep. 1983 and in Paris, 12-13 Sep. 1983 (AGARD-LS-128; ISBN-92-835-1455-6) Avail: NTIS HC A07/MF A01

Basic concepts, theories, and computer methods involved in the design of advanced guidance and control systems are presented. Direct digital analysis and synthesis procedures are reviewed. Computer aided and graphical techniques that can be employed in preliminary design, synthesis and real time simulation are presented. A supporting bibliography is included.

N84-10094# Stanford Univ., Calif. Dept. of Electrical Engineering.

FUNDAMENTALS OF ANALYSIS FOR DIGITAL CONTROL SYSTEMS

G. F. FRANKLIN *In* AGARD Computer-Aided Design and Anal. of Digital Guidance and Control Systems 15 p Jul. 1983 refs Avail: NTIS HC A07/MF A01

The theoretical background and practical tools for the design of a control system which is to be implemented using a computer or microprocessor are provided. The methods studied are primarily for closed loop (feedback) systems in which the dynamic response of the process being controlled is a major consideration in the design. The design methods are applicable to any type of computer (from microprocessors to large scale computers), however, the effects of small word size and slow sample rates take on a more important role when using microprocessors. Both the continuous design and digitization method and the direct digital method are covered. The advantages and disadvantages are discussed. A. R. H.

N84-10095# Kingston Polytechnic, Kingston-Upon-Thames (England).

DESIGN ENVIRONMENTS AND THE USER INTERFACE FOR CAD OF CONTROL SYSTEMS

M. J. DENHAM *In* AGARD Computer-Aided Design and Anal. of Digital Guidance and Control Systems 9 p Jul. 1983 refs Avail: NTIS HC A07/MF A01

The design of a total CAD environment in which control systems design software can be embedded is considered. This environment includes a rich set of software tools for the creation, modification, simulation and analysis of dynamic system models and a powerful user interface to these tools which incorporates an interactive algorithmic design language. An analogy can be made between such a CAD environment and those which exist currently for software development, e.g., Interlisp. The features which such an environment should possess and how these might be developed are described. Particular attention is devoted to the user interface since it is now generally recognized that the quality of the man computer interface is crucial to the successful use of a CAD system. The human factors aspects of the interface are reviewed and examples of how a CAD system can be designed to take account of these aspects. The DELIGHT system from the University of California, Berkeley, is referred to as an example of a user orientated design environment. Author

N84-10096# Lund Inst. of Tech. (Sweden). Dept. of Automatic Control.

MODELING AND SIMULATION TECHNIQUES

K. J. ASTROEM *In* AGARD Computer-Aided Design and Anal. of Digital Guidance and Control Systems 18 p Jul. 1983 refs Avail: NTIS HC A07/MF A01

Systematic methods for design of control systems require mathematical models of the dynamics of processes and disturbances. An overview of techniques for obtaining such models is presented. Modeling from first principles and modeling from data are discussed. Particular emphasis is given to computer aided tools for obtaining and verifying the models. Two interactive software packages: Simnon, for nonlinear simulation, and Idpac, for data analysis and identification are described. Speculation on future trends is included. Author

N84-10097# University of Southern California, Los Angeles. Dept. of Electrical Engineering Systems.

NUMERICAL ASPECTS OF CONTROL DESIGN COMPUTATIONS

A. J. LAUB *In* AGARD Computer-Aided Design and Anal. of Digital Guidance and Control Systems 16 p Jul. 1983 refs Avail: NTIS HC A07/MF A01

The interplay between recent results and methodologies in numerical linear algebra and mathematical software and their application to problems arising in systems, control, and estimation theory is discussed. The impact of finite precision, finite range arithmetic (including the implications of the proposed IEEE Floating

Point Standard(s) on control design computations is illustrated with numerous examples as are pertinent remarks concerning numerical stability and conditioning. Basic tools from numerical linear algebra such as linear equations, linear least squares, eigenproblems, generalized eigenproblems, and singular value decomposition are then outlined. A selected list of applications of the basic tools follows including algorithms for solution of problems such as matrix exponentials, frequency response, system balancing, and matrix Riccati equations. The implementation of such algorithms as robust mathematical software is discussed. Characteristics of reliable mathematical software, availability and evaluation, language implications (FORTRAN, ADA, etc.), and the overall role of mathematical software as a component of computer aided control system design are among the issues addressed. A.R.H.

N84-10098# Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.

PERFORMANCE AND ROBUSTNESS ASPECTS OF DIGITAL CONTROL SYSTEMS

J. E. WALL, J. C. DOYLE, G. L. HARTMANN, N. A. LEHTOMAKI, and G. STEIN /in AGARD Computer-Aided Design and Anal. of Digital Guidance and Control Systems 33 p Jul. 1983 refs
Avail: NTIS HC A07/MF A01

A formulation of the feedback control problem captures both the performance and robustness aspects of feedback. The structured singular value provides the solution to this problem. The problem formulation and solution are reviewed and its applicability is extended and its applicability to digital feedback control systems. A digital compensator is treated as though it were an analog compensator through the use of sectors. An integrated flight propulsion control system is used as an illustrative example. Author

N84-10099# Stanford Univ., Calif. Dept. of Electrical Engineering

DIRECT DIGITAL DESIGN VIA POLE PLACEMENT TECHNIQUES

G. F. FRANKLIN /in AGARD Computer-Aided Design and Anal. of Digital Guidance and Control Systems 13 p Jul. 1983 refs
Avail: NTIS HC A07/MF A01

The design of the dynamics of a digital control for satisfactory transient response can be done in a number of ways. One of the more effective ways is to do the design so that the poles of the closed loop system are in desired or at least acceptable locations. Such design schemes are known as pole placement methods. The method of pole placement is described and formulas suitable for computer implementation are given. Also, the method is compared to both transform methods and to methods based on optimal control, including stochastic control and the Kalman filter. Several examples illustrate the methods. Author

N84-10100# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.

SYSTEMATIC COMPUTER AIDED CONTROL DESIGN

G. GRUEBEL and G. KREISSELMEIER /in AGARD Computer-Aided Design and Anal. of Digital Guidance and Control Systems 7 p Jul. 1983 refs
Avail: NTIS HC A07/MF A01

Computerized synthesis techniques of modern control theory are in widespread use, but a number of fundamental design problems still remain: the design specifications problem; the free design parameter problem; the plant complexity versus controller simplicity problem; and the dirty design environment problem. A design procedure which comes close to solving these design problems is recommended. It is an iterative design technique using a performance index vector which provides a systematic guidance for the designer to take care of multiple design objectives simultaneously and individually. As a design tool, unconstrained parameter optimization is used. A practical application is reported: the design of a robust control loop for a fighter aircraft where 42 performance criteria of 9 different sorts are considered simultaneously. Author

N84-10101# Lund Inst. of Tech. (Sweden). Dept. of Automatic Control.

PRACTICAL ASPECTS OF DIGITAL IMPLEMENTATION OF CONTROL LAWS

K. J. ASTROEM /in AGARD Computer-Aided Design and Anal. of Digital Guidance and Control Systems 9 p Jul. 1983 refs
Avail: NTIS HC A07/MF A01

Practical problems associated with digital computer implementation control laws are discussed. The key problem is to convert a digital control law in state space or polynomial form into a computer program which gives the desired results. The paper covers: sensor and actuator interfaces, analog prefiltering, actuator saturation, anti-windup, numerics and coding. Author

N84-11111# Princeton Univ., N. J.

DATA ACQUISITION FOR STALL/SPIN FLIGHT RESEARCH

M. SRIJAYANTHA /in NASA. Langley Research Center Joint Univ. Program for Air Transportation Res. p 141-156 Oct. 1983

Avail: NTIS HC A07/MF A01 CSDL 01C

A special purpose digital data acquisition system is built for stall/spin flight research. A Schweizer 2-32 sailplane is used as the test vehicle. Computer hardware and its architecture are described. Concepts of system failure detection are considered in the design. Special instrumentation developed for the high angle of attack flight is presented. A representative flight time history of a maneuver also is shown. The flight data will be used for the identification of aerodynamic parameters. Author

N84-11118# Societe Nationale Industrielle Aerospatiale, Toulouse (France).

AEROSPATIAL'ES APPROACH TO THE STUDY OF FLUTTER AT THE DESIGN STAGE OF THE PROJECT [APPROCHE AEROSPATIALE DE L'ETUDE DU FLOTTEMENT AU NIVEAU DE L'AVANT-PROJET]

M. CURBILLON /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 32 p Sep. 1983 refs In FRENCH; ENGLISH summary
Avail: NTIS HC A14/MF A01

Because of its importance from the point of view of safety and certification, the flutter behavior of a plane must be estimated as soon as possible in the study of a project. In fact, geometry, structural conception, and sizing could be strongly influenced by this phenomena. The problem is formulated in order to present the most important factors. The objectives of the flutter study at the design stage are defined. The approach of the simplified mathematical model, normal modes and flutter calculations are exposed. Examples from aerospatiale studies are included. Author

N84-11121# Royal Netherlands Aircraft Factories Fokker, Schiphol-Oost.

TRANSONIC FLUTTER CLEARANCE FOR A SUPERCRITICAL TRANSPORT AIRCRAFT IN THE PRELIMINARY STAGE

N. PRONK, H. WALGEMOED, and R. J. ZWAAN (NLR, Amsterdam) /in AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 13 p Sep. 1983 refs
Avail: NTIS HC A14/MF A01

Recently, design studies for a short haul transport with a supercritical wing were made. One of the aeroelastic questions to be answered already in the preliminary design phase of these wings was the question of flutter freedom in the foreseen flight envelope. A survey is given of the steps taken in the flutter clearance, especially those which were prompted by the transonic aspects. Aerodynamic investigations are discussed involving transonic wind tunnel tests on oscillating supercritical airfoils, transonic flutter tests on a supercritical wing model and the development of calculation methods. A flutter analysis method for these transonic conditions is verified on the wind tunnel model results and applied to the full scale design, showing the influence of the transonic aerodynamics. R.J.F.

08 AIRCRAFT STABILITY AND CONTROL

N84-11122# Vereinigte Flugtechnische Werke G.m.b.H., Bremen (West Germany)

INFLUENCE OF MAIN DESIGN PARAMETERS ON FLUTTER BEHAVIOUR FOR AIRCRAFT CONFIGURATIONS WITH HEAVY CONCENTRATED MASSES

H. ZIMMERMAN and S. VOGEL *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 11 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

Heavy concentrated masses fitted elastically to the wing can induce flutter in an aircraft. This flutter case is well known for fighter aircraft with certain store configurations. For transport aircraft this flutter case becomes more and more important especially for wing engined aircraft with heavy engines, and modern transonic profiles. The structural and aerodynamic influence parameters for this flutter case are described for a particular project. A flutter speed inside the flight envelope caused by this type of flutter can only be prevented by taking account of aeroelastic criteria and their influence on the early design of the aircraft. For a frozen design this flutter case can only be prevented by penalizing the weight and drag properties of the aircraft. Because transonic aerodynamics also decreases the flutter speed (known as the transonic dip) for aircraft with modern transonic profiles this flutter case deserves special consideration. Author

N84-11124# Douglas Aircraft Co., Inc., Long Beach, Calif.

THE DEVELOPMENT OF FAST-FLOW (A PROGRAM FOR FLUTTER OPTIMIZATION TO SATISFY MULTIPLE FLUTTER REQUIREMENTS)

B. A. ROMMEL *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 17 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

FAST-FLOW is being developed as a production program for finite element flutter optimization. This program is the third step in an automated sequential structural design process that begins with an optimization for buckling and static strength. FAST-FLOW features a user selected design optimization procedures such as the feasible direction design search in CONMIN or a criteria optimizer to provide the structural resizing. Multiple flutter requirements resulting from variations in payload, fuel state, speed, and altitude are simultaneously satisfied FAST-FLOW tracks both flutter speed and hump mode damping factors in design space. Second order Taylor approximations of the flutter speeds and hump mode damping factors may be updated periodically during a fully automated design cycle. During an update, the model is resembled in modal form, modes are updated, and the location of the flutter speeds and hump modes is reestablished. Then, the gradient and Hessian matrices used in the Taylor approximations for each requirement are updated. These design sensitivities are then used in a fast redesign cycle with the optimizer until the design converges or a new update is required. Program architectural considerations are presented and contrasted with standard structural analysis programs. The impact of finite element dynamics on standard production flutter analysis procedures is also discussed. Author

N84-11125# Royal Aircraft Establishment, Farnborough (England).

THE INITIAL DESIGN OF ACTIVE CONTROL SYSTEMS FOR A FLEXIBLE AIRCRAFT

I. W. KAYNES and D. E. FRY *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 17 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

Methods have been developed for designing active control systems to alleviate the symmetric loads due to vertical gusts on a flexible aircraft. Techniques for choosing sensor positions and system gains are demonstrated, with the interpretation of results being aided by graphical methods that allow easy assessment of conflicting objectives and system constraints. A relatively simple model shows that loads in continuous turbulence can be alleviated by at least 50%, with ailerons driven by feedback signals from accelerometers at the center of gravity and on the wing and with pitch stability augmented using the elevators. Maneuverable loads

are also alleviated. The methods are shown to be useful for predicting the potential of active controls at an early stage of design definition. The possibility of slight degradations from a number of sources is assessed, including more complex representations of the aileron actuator and the sensors, aileron rate limitations and different choices of gust model. Author

N84-11127# Westland Helicopters Ltd., Yeovil (England).

THE INFLUENCE OF AEROELASTIC STABILITY REQUIREMENTS ON HELICOPTER DESIGN

S. P. KING *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 12 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

The avoidance of aeroelastic and aeromechanical instabilities is a prime objective of aircraft design, and must be considered throughout the design cycle. Due to lack of data the analysis of instabilities during preliminary design is a difficult task, consequently simple models may be more useful than large and complex analyses. A number of potential instabilities are discussed; blade flutter; main rotor flap lag stability; tail rotor pitch flap lag and the complete aircraft problems of ground and air resonance. In each case a description of the mechanism involved in the instability is given and a simple analytic tool for its investigation is suggested. Author

N84-11134# Rockwell International Corp., El Segundo, Calif.

A FLUTTER OPTIMIZATION PROGRAM FOR COMPLETE AIRCRAFT STRUCTURAL DESIGN

S. SIEGEL *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 17 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

A new computer program for flutter optimization has been developed and successfully used to accurately account for the interactive aerodynamic and structural effects of the complete aircraft. The program is both cost and time effective when compared with alternate available approaches and can be used from preliminary through advanced design stages. To insure that strength requirements are met, the optimization program starts with the strength design and automatically performs an iterative solution to raise the complete aircraft flutter speed. During each cycle of iteration, local areas of structure are stiffened by applying the criterion of constant strain energy density in the flutter mode to obtain near minimum weight solution. This program has successfully analyzed recent complete aircraft designs to provide adequate structure for flutter safety. Author

N84-11135# Politecnico di Milano (Italy). Ist. di Ingegneria Aerospaziale.

FAST FLUTTER CLEARANCE BY PARAMETER VARIATION

V. GIAVOTTO, P. MANTEGAZZA, T. MERLINI, L. DEOTTO (Aermacchi, Varese, Italy), M. LUCCHESINI (Aermacchi, Varese, Italy), and R. MANTELLI (Aermacchi, Varese, Italy) *In* AGARD Aeroelastic Considerations in the Preliminary Design of Aircraft 12 p Sep. 1983 refs

Avail: NTIS HC A14/MF A01

After a discussion regarding the main requirements of the study of flutter in the preliminary design, a unified computation system is proposed, which can effectively perform the various types of analysis required. This system was implemented and confirmed through the comparison with experimental results obtained with a wind tunnel model. The computation system used for the flutter analysis of a combat aircraft with external stores proved to be effective and adequately accurate even in the hardest situations, when the gradients of the critical speed with respect to design parameters are very high. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

N84-11176*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SIMULATION AND EVALUATION OF THE SH-2F HELICOPTER IN A SHIPBOARD ENVIRONMENT USING THE INTERCHANGEABLE CAB SYSTEM

C. H. PAULK, JR., D. L. ASTILL, and S. T. DONLEY (NADC, Warminster, Pa.) Aug. 1983 87 p refs
(NASA-TM-84387; A-9435; NAS 1 15:84387) Avail: NTIS HC A05/MF A01 CSCL 01C

The operation of the SH-2F helicopter from the decks of small ships in adverse weather was simulated using a large amplitude vertical motion simulator, a wide angle computer generated imagery visual system, and an interchangeable cab (ICAB). The simulation facility, the mathematical programs, and the validation method used to ensure simulation fidelity are described. The results show the simulator to be a useful tool in simulating the ship-landing problem. Characteristics of the ICAB system and ways in which the simulation can be improved are presented. S.L.

N84-11177*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

ADAPTIVE INVERSE CONTROL FOR HELICOPTER VIBRATION REDUCTION

S. A. JACKLIN Sep. 1983 19 p refs
(NASA-TM-84336; NAS 1.15:84336) Avail: NTIS HC A02/MF A01 CSCL 01C

The reduction or alleviation of helicopter vibration will reduce maintenance requirements while at the same time increase ride quality and helicopter reliability. In forward flight, the helicopter's fuselage vibration spectrum tends to be dominated by multiples of the N/REV component. A way to use the method of adaptive inverse control to identify, in real-time, a controller capable of generating N/REV vibration of opposite phase to cancel the uncontrolled N/REV component is presented. Multicyclic feathering of blade pitch is the control considered. Author

N84-11178*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A FLIGHT-TEST EVALUATION OF A GO-AROUND CONTROL SYSTEM FOR A TWIN ENGINE POWERED-LIFT STOL AIRPLANE

D. M. WATSON and G. H. HARDY Oct. 1983 21 p refs
(NASA-TM-84408; A-9482; NAS 1 15 84408) Avail: NTIS HC A02/MF A01 CSCL 01C

An automatic go-around control system was evaluated on the Augmentor Wing Jet Short Takeoff and Landing (STOL) Research Airplane (AWJSRA) as part of a study of an automatic landing system for a powered-lift STOL airplane. The results of the evaluation indicate that the go-around control system can successfully transition the airplane to a climb configuration from any initiation point during the glide-slope track or the flare maneuver prior to touchdown. Author

N84-11179# Air Force Academy, Colo.

AIRBORNE LABORATORY MEASUREMENT OF AIRCRAFT PERFORMANCE AND STABILITY AND CONTROL FOR LIGHT AIRCRAFT. SUPPLEMENT

K R CRENSHAW 24 Jun 1983 173 p refs
(AD-A131457; USAFA-TN-83-3-SUPPL) Avail: NTIS HC A08/MF A01 CSCL 01C

This report is a supplement to the article 'Integration of an Airborne Laboratory into the United States Air Force Academy Academic Curriculum' in USAFA-TR-83-2. It contains the test plans, flight test planning guides, and aircraft specifications handouts used during the applications phase of the Department of Aeronautics Airborne Laboratory. Sample calculations and plots from actual flight test data taken by cadets are also included. While at test plans, flight test planning guides, and aircraft specifications were designed to be used with the Beechcraft Sierra and Sundowner, the formats are sufficiently general so that they can be applied to any single-engine, general aviation aircraft. Commonly recognized flight test techniques are used for gathering

data, and data reduction is accomplished using accepted procedures. Author (GRA)

N84-11180# Technische Univ., Munich (West Germany). Lehrstuhl fuer Flugmechanik und Flugregelung.

GUST ALLEVIATION Final Report [BOENABMINDERUNG]

G. BRUENING 1983 167 p refs In GERMAN
(Contract DFG-BR-201/16)
Avail: NTIS HC A08/MF A01

Gust alleviation concepts were studied numerically on a Boeing 707 aircraft with autopilot. Stochastic gust processes were studied in the frequency domain. The calculations show that the best solution is the control of the pitch position and the pitch velocity by using the autopilot mode pitch-hold. It is shown that additional control systems (e.g. transverse control) can substantially reduce disturbance. The influence of aircraft elasticity can only be assessed in a very simplified way. Deformations of airfoils and effects on stationary aerodynamics are determined. Author (ESA)

09

RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

A84-10045#

TACTICAL AIR CONTROL SYSTEM EXPERIMENTS IN COMMAND AND CONTROL AUTOMATION

H. FISCHER (Litton Industries, Litton Data Systems, Van Nuys, CA) IN: Computers in Aerospace Conference, 4th, Hartford, CT, October 24-26, 1983, Collection of Technical Papers. New York, American Institute of Aeronautics and Astronautics, 1983, p. 287-290. refs
(AIAA PAPER 83-2396)

The USAF Tactical Air Control System includes all command and control elements which support a land battle, decentralizing its control and execution branches. Attention is presently given to the history of unsuccessful attempts to automate the mission planning and direction elements of TACS, followed by the surprising results of recent experimental efforts. It appears that, while conventional approaches to large scale military system implementation defy automation, the use of a commercial Data Base Management System applications generator has been successfully demonstrated, and a subsequent experiment based on a fifth-generation computer architecture employing the Prolog AI computer language has shown even more significant promise. O.C.

A84-10551

FLOW QUALITY IN WIND TUNNELS; MEETING, BREMEN, WEST GERMANY, SEPTEMBER 9, 10, 1982, REPORTS [STROEMUNGSQUALITAET IN WINDKANALEN; SITZUNG, BREMEN, WEST GERMANY, SEPTEMBER 9, 10, 1982, VORTRAEGE]

Meeting sponsored by the Deutsche Gesellschaft fuer Luft- und Raumfahrt. Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 154 p. In German and English

The testing and improvement of flow quality and the effect of flow quality on test results in wind tunnels are examined. The topics discussed include: calibration of test section flow in the German-Dutch wind tunnel; hot-wire anemometer measurements in large wind tunnels; improving the flow quality in an open wind tunnel; the DFVLR Goettingen high-pressure wind tunnel tunnel characteristics and flow quality; investigation of transonic test sections with comparison of perforated and slotted walls; and flow quality in ETW rig. Also considered are: effects of wind tunnel turbulence on test results and model test results; effect of increased turbulence on the flow around a transonic profile; wind tunnel

09 RESEARCH AND SUPPORT FACILITIES (AIR)

effects in vehicle aerodynamics; and transonic flow around a profile with heat input via condensation. C.D.

A84-10552#

CALIBRATION OF THE TEST SECTION FLOW IN THE GERMAN-DUTCH WIND TUNNEL [DIE KALIBRATION DER MESSSTRECKENSTROMUNG DES DEUTSCH-NIEDERLAENDISCHEN WINDKANALS]

D. ECKERT (Duits-Nederlandse Windtunnel, Emmerloord, Netherlands) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports . Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 7 p. In German.

A84-10553#

HOT-WIRE ANEMOMETER MEASUREMENTS IN LARGE WIND TUNNELS [HITZDRAHT-ANEMOMETER MESSUNGEN IN GROSSWINDKANALEN]

E. FROEBEL and U. MICHEL (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Abteilung Turbulenzforschung, Berlin, West Germany) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports . Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 16 p. In German. refs

Experimental and theoretical results of hot-wire anemometer measurements in three-meter wind tunnels are reported. The causes of wind tunnel turbulence are reviewed, and the applicable testing technology is discussed, including sondes, the anemometers themselves, turbulence testers, and spectrum analyzers. Results are presented for the turbulence components over a profile curve, the frequency spectra, comparative wind tunnels, and the frequency curve. C.D.

A84-10554#

IMPROVING THE FLOW QUALITY IN AN OPEN WIND TUNNEL [VERBESSERUNG DER STROMUNGSQUALITAET EINES FREISTRALHWINDKANALS]

C. KRAMER and H. J. GERHARDT (Aachen, Fachhochschule, Aachen, West Germany) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports . Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 18 p. In German

Model tests were performed on a modified 1:5 copy of a wind tunnel with the aim of improving the flow quality. The resulting improvement was measured by comparing parameters of flow and series of resistance measurements for the copy and the original wind tunnel. Improvements have been achieved in both tunnels. The resistance coefficients show good agreement with calculative results obtained for identical vehicles in a large wind tunnel with less blocking. C.D.

A84-10555#

THE DFVLR GOETTINGEN HIGH-PRESSURE WIND TUNNEL - TUNNEL CHARACTERISTICS AND FLOW QUALITY [DER HOCHDRUCKWINDKANAL DER DFVLR GOETTINGEN KANALEIGENSCHAFTEN UND STROMUNGSQUALITAET]

E. MELZER and H.-J. BENDIG (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hauptabteilung Windkanale, Goettingen, West Germany) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports . Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 20 p. In German.

The Goettingen high-pressure wind tunnel operated since 1981 is described. The pressure in the tunnel can attain 100 bar while the maximum Reynolds number is twelve million and can be varied by a factor of one thousand. The attainable circulation velocity, requisite power, the circulation efficiency factor, compressibility factor, and dynamic viscosity are given. The flow quality in the closed test section was determined by total pressure and static wall pressure distribution measurements, and the results are presented. C.D.

A84-10556#

FLOW QUALITY IN THE ETW RIG

W. SCHROEDER and J. NIEZGODKA (European Transonic Windtunnel, Amsterdam, Netherlands) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports . Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 6 p.

Measurements of the flow uniformity in the settling chamber and test section, of the flow angularity at the nozzle inlet and in the test section, and of the pressure gradient along the test section center line have been performed on the European Transonic Wind Tunnel rig, and the results are reported. Turbulence measurements at the wide angle diffuser inlet and the settling chamber outlet are presented along with a turbulence level prediction for the test section. The test results show that the basic flow quality requirements for the test section can be met with the present circuit layout. C.D.

A84-10557#

INVESTIGATION OF TRANSONIC TEST SECTIONS WITH COMPARISON OF PERFORATED AND SLOTTED WALLS

H. SORENSEN (Flygtekniska Forsoksanstalten, Bromma, Sweden) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports . Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 8 p. refs

A calibration of the transonic test section of the FFA trisonic tunnel TVM 500 was performed to investigate flow quality and tunnel settings for three different types of test sections, perforated walls with 6 percent fixed porosity, strip-perforated walls with variable porosity between 1.6 percent and 7.9 percent and slotted walls with an open area of 4 percent. Some selected results from the calibration are presented in this paper. Author

A84-10558#

EFFECTS OF WIND TUNNEL TURBULENCE ON TEST RESULTS. I PROBLEMATIC, PLANNED INVESTIGATIONS, TURBULENCE IN LEVEL FLOW: DISCUSSION ISSUE [EINFLUSS DER WINDKANALTURBULENZ AUF DIE MESSERGEBNISSE. I PROBLEMATIK, VORLIEGENDE ARBEITEN, TURBULENZEFFEKTE BEI EBENER STROMUNG: DISKUSSIONSANREGUNG]

E. THIEL (Dornier GmbH, Friedrichshafen, West Germany) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports . Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 22 p. In German. refs

The development of knowledge of the effects of wind tunnel turbulence on test results is reviewed, and present-day methods of attacking the problem are addressed. Turbulence phenomena at the surface of plates of various shapes are considered, and important relationships which have been derived by previous research are given. C.D.

A84-10559#

EFFECT OF WIND TUNNEL TURBULENCE ON MODEL TEST RESULTS. II COMPARATIVE TESTS IN GERMAN 3-M WIND TUNNELS [EINFLUSS DER WINDKANALTURBULENZ AUF MESSERGEBNISSE VON MODELLEN. II - VERGLEICHENDE MESSUNGEN IN DEUTSCHEN 3-M-WINDKANALEN]

P. DICK (Dornier GmbH, Friedrichshafen, West Germany) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports . Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 12 p. In German. refs

The results of turbulence tests using the Alpha Jet and VFW 614 standardized models, and of turbulence tests in the open test section using anemometry, are discussed. The turbulence structure and grid, the quality of the tests, the distribution of turbulence along the test section, and the influence of turbulence on maximal buoyancy are addressed. The results suggest that manipulation of turbulence to achieve identical degrees of turbulence in wind tunnels is of little use, since it is not possible to control all variables in the overall turbulence structure. C.D.

A84-10561#

**WIND TUNNEL EFFECTS IN VEHICLE AERODYNAMICS
[WINDKANALEFFEKTE IN DER FAHRZEUGAERODYNAMIK]**

C. KRAMER and H. J. GERHARDT (Aachen, Fachhochschule, Aachen, West Germany) IN: Flow quality in wind tunnels; Meeting, Bremen, West Germany, September 9, 10, 1982, Reports. Bremen, Vereinigte Flugtechnische Werke GmbH, 1982, 11 p. In German. refs

Test results for a single vehicle in different European large wind tunnels are compared using flow measurements during drive tests. The factors influencing the resistance measurements are discussed and suggestions for optimizing the free flow test sections are presented. C.D.

A84-11048#

ADAPTABLE WIND TUNNEL FOR TESTING V/STOL CONFIGURATIONS AT HIGH LIFT

W. R. SEARS (Arizona, University, Tucson, AZ) (International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings. Volume 1, p. 720-730) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 968-974. refs (Contract N00014-79-C-0010)

Previously cited in issue 20, p. 3156, Accession no. A82-40949

A84-11061#

PRE-SIMULATOR PART-TASK TRAINING

A. L. LIPPAY, L. WHITE, and A. GRYNSPAN (CAE Electronics, Ltd., Montreal, Canada) IN: International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings. Part 1 Hanover, West Germany, Deutsche Messe-und Ausstellungs-AG, 1983, 26 p.

Computer Managed Training, or CMT, is a system which is currently offered by a Canadian company as an adjunct to flight training. CMT relieves the simulator and the instructor from the task of procedure training and enables the trainee to make better use of simulator time. CMT can provide either an alternative method of training, or it can be employed to supplement existing procedure trainers and simulators. Attention is given to the background regarding the development of CMT, teaching features and capabilities, and details concerning an integrated training system approach. G.R.

A84-11623

THE DEVELOPMENT OF A NEW AIRPORT, CHANGI, SINGAPORE

L. H. SAN (Department of Civil Aviation, Singapore) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 229-236.

A84-11919

VISUAL SYSTEMS IN FLIGHT SIMULATION

R. MCLANAGHAN (Singer Co., Link Flight Simulation Div., Binghamton, NY) IN: World Congress on System Simulation and Scientific Computation, 10th, Montreal, Canada, August 8-13, 1982, Proceedings. Volume 2. Montreal, International Association for Mathematics and Computers in Simulation, 1983, p. 70-72.

The most challenging aspect of flight simulation is representation of the visual scene as it appears through the aircraft windshield. The visual information required by the pilot depends on the mission he is performing and this varies between the approach/landing task where only the air field need be depicted to low altitude helicopter flying that necessitates the generation of a large amount of detail over a very large field of view. A review is made of the different simulation techniques that have been used with a discussion of film systems, television cameras and terrain models, and also the latest fully digital systems. Author

A84-11920

FLIGHT SIMULATOR INSTRUCTOR STATIONS - CONTROLLING THE TRAINING PROBLEM

E. R. PERRY (Singer Co., Link Flight Simulation Div., Binghamton, NY) IN: World Congress on System Simulation and Scientific Computation, 10th, Montreal, Canada, August 8-13, 1982, Proceedings. Volume 2. Montreal, International Association for Mathematics and Computers in Simulation, 1983, p. 73-75.

It is the primary function of the instructor station to provide the instructor with the capability of setting up a training environment and monitoring the performance of the student within that environment. Instructor station hardware is related to three broad categories, taking into account instructor-pilot communication, computer input, and computer output. Attention is given to the hardware interface, aspects of environmental set-up and modification, and questions of trainee evaluation. G.R.

A84-12305#

THE AIR FORCE FLIGHT TEST CENTER ARTIFICIAL ICING AND RAIN TESTING CAPABILITY

K. J. ADAMS (USAF, Edwards AFB, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 6 p. (AIAA PAPER 83-2688)

The Air Force Flight Test Center has the charter to conduct all-weather testing on Air Force weapon systems. This includes testing in airborne icing conditions and in rain. To date, a high speed (180-300 knots) NKC-135 modified for artificial ice/rain testing has been used. This system is currently being upgraded to provide a more reliable, technically adequate cloud simulation. The Palletized Airborne Water Spray System (PAWSS), utilizing a C-130 cargo aircraft, will complement the NKC-135 with a speed range of 100-180 knots (100-250 knots using a C-130H model). The PAWSS is self-contained and is built on a cargo pallet and requires no modifications to its carrier aircraft. Author

A84-12313#

GULF RANGE TEST CAPABILITIES

A. L. FREEMAN (USAF, Armament Div., Eglin AFB, FL) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p. (AIAA PAPER 83-2707)

The Gulf Range test resources located at Eglin Air Force Base, Florida, to support air armament and electronic combat test and training are presented. An overview of the test activities, facilities, instrumentation and test ranges is discussed as a baseline to provide perspective for the major test capability improvements which are being implemented. Major test capability upgrades are identified to meet new technology weapon system test requirements through the year 2000. Author

A84-12325#

A DISTRIBUTED, REAL TIME, FLIGHT TEST SYSTEM

R. H. IDSARDI (Computer Sciences Corp., Lompoc, CA) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 10 p. (AIAA PAPER 83-2732)

This paper presents the design, functional capabilities, and performance attributes of a flight test system under development for the Air Force Flight Test Center (AFFTC) at Edwards AFB. The system features a range of 32-bit processors inter-connected via multiple 50 Megabit trunks. The system is conveniently configured by software to process real time telemetry and positional data and output this data as sophisticated graphic displays. The design is especially modular, providing a continuum of support for small, medium, and large missions. Author

09 RESEARCH AND SUPPORT FACILITIES (AIR)

A84-12329#

AIR FORCE FLIGHT TEST INSTRUMENTATION SYSTEM

M. F. LAMY (SCI Systems, Inc., Huntsville, AL) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 6 p.
(AIAA PAPER 83-2736)

Approximately three years ago, a study was initiated with the objective to define a general purpose system which would replace the systems currently in use at the various System Command Centers. The Air Force Flight Test Instrumentation System (AFFTIS) was a direct result of the study. A contract for the development of AFFTIS was awarded in late December, 1982. The system is scheduled to be available for operational use in 1986. Attention is given to the design goals, the design approach, the AFFTIS system controller, the data acquisition units, and the ground support equipment. G.R.

A84-12345#

TELEMETRY GROUND STATION OFFERS INCREASED PRODUCTIVITY IN FLIGHT TESTING

O. J. STROCK (Fairchild Weston Systems, Inc., Sarasota, FL) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 10 p.
(AIAA PAPER 83-2759)

In telemetry/computer systems employed in the conduction of flight tests, significant trends exist towards higher data rates, more complex data formats, hardware preprocessing and compression, faster more versatile interfaces to general-purpose computers, the 32-bit computer system, a small dedicated secondary computer, and smarter display devices. A description is provided of a system architecture which addresses these trends. Attention is given to system configurations, aspects of setup and control, self-diagnostics, aspects of physical layout and buses, an expanded configuration, a minimum configuration, high-speed hardware data compression, and high-speed preprocessing characteristics. G.R.

A84-12346#

GRUMMAN'S AUTOMATED TEST SYSTEM PAST, PRESENT AND FUTURE

C. SCHIANO and E. M. SIMPSON (Grumman Data Systems Corp., Calverton, NY) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 17 p.
(AIAA PAPER 83-2760)

This paper traces the various configurations of the Grumman Automated Test System (ATS) through its planned 25 year (1970-1995) life cycle and shows how Grumman has expanded the system and kept it operational and effective. The ATS history at Grumman's flight test center and other government facilities is detailed. The past, present and future configurations of the Calverton ATS, and their capabilities are summarized. Author

A84-12347#

LOW LEVEL DELIVERY TEST PROGRAM - CORRELATION OF WIND TUNNEL/SLED TRACK TEST SEPARATION RESULTS

M. A. KUNTAVANISH (USAF, Arnold Engineering Development Center, Arnold Air Force Station, TN) and R. CANCEL (USA, Armament Test Laboratory, Eglin AFB, FL) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p.
(AIAA PAPER 83-2761)

A comparison of the AEDC wind tunnel test and Holloman Sled Track Test results on the LLD system is presented herein. The wind tunnel test was conducted in the Aerodynamic Wind Tunnel (4T) using 0.05-scale models at Mach numbers of 0.5 to 1.2. The Mach numbers used in this comparison are 0.5, 0.9, and 1.2. The sled track test was conducted on the 50,000-ft track using full-scale models. The Mach number results used in this comparison are 0.58, 0.83, and 1.2. Store trajectory data versus time were compared at similar Mach numbers. The results of the comparison showed that the two tests compared well with respect to Z and X, but not with respect to Y, pitch or yaw angles. Factors that may have caused some of the differences in the comparison

were accidents that occurred during the sled track test and the limitations of each test method. Author

A84-12348#

RF PRODUCTION TEST FACILITY FOR THE LAMPS SH-60B SEA HAWK

S. R. PARSONS (IBM, Flight Test Operations, Owego, NY) AIAA, AHS, IES, SETP, SFTE, and DGLR, Flight Testing Conference, 2nd, Las Vegas, NV, Nov. 16-18, 1983. 8 p.
(AIAA PAPER 83-2762)

LAMPS Mark III is an advanced Naval Air/Ship system which greatly expands the influence of surface ships. During full scale development, four SH-60B aircraft were equipped with electronic equipment and tested. LAMPS Mark III is currently in the production phase. Electronic equipment with 14 antennas are installed on the completed SH-60B aircraft. An acceptance test is to be conducted before the system is delivered to the customer. The present investigation is concerned with the structure and subsequent test facility developed for ground acceptance testing. The arising problems are discussed along with their resolution. It is pointed out that effects of weather on ground testing have been virtually eliminated. G.R.

N84-10003# Joint Publications Research Service, Arlington, Va. DEPUTY MINISTER SVECHNIKOV ON CIVIL AVIATION CONSTRUCTION PROJECTS

In its USSR Rept.: Transportation, No. 126 (JPRS-84457) p 3-6 3 Oct. 1983 Transl into ENGLISH from Vozdushnyy Transport (USSR), 21 Apr. 1983 p 2
Avail: NTIS HC A05

The construction and maintenance of airports are discussed. Ground management is discussed. Plans for future air terminals are discussed. R.J.F.

N84-10006# Joint Publications Research Service, Arlington, Va. UPGRADED YAKUTSK AIRPORT OPENS TO IL-62 SERVICE

O. BORODIN *In its* USSR Rept.: Transportation, No. 126 (JPRS-84457) p 11-12 3 Oct. 1983 Transl. into ENGLISH from Vozdushnyy Transport (USSR), 2 Jul 1983 p 1
Avail: NTIS HC A05

The opening of a runway at Yakutsk airport is discussed. It can handle the landing of IL-62 aircraft. R.J.F.

N84-10007# Joint Publications Research Service, Arlington, Va. UZBEK SSR CITY OF SHAKHRISABZ OPENS NEW AIRPORT: TOBEEK PLANNED

S. ZAYNUTDINOV *In its* USSR Rept. Transportation, No. 126 (JPRS-84457) p 13 3 Oct. 1983 Transl. into ENGLISH from Vozdushnyy Transport (USSR), 5 Jul. 1983 p 1
Avail: NTIS HC A05

The opening of a new airport in the city of Shakhrisabz is discussed. It is noted that the region is a tourist center, drawing thousands of visitors each year to look at monuments of antiquity. R.J.F.

N84-10102# Dayton Univ., Ohio.

THREE-DIMENSIONAL TEST EXPERIENCE WITH A TRANSONIC ADAPTIVE-WALL WIND TUNNEL Final Report, Apr. 1981 - Dec. 1982

D. J. HARNEY Wright-Patterson AFB, Ohio AFWAL Mar. 1983 86 p refs
(Contract F33615-79-C-3030; AF PROJ. 2404)
(AD-A129858, AFWAL-TR-83-3028) Avail: NTIS HC A05/MF A01 CSCL 14B

A square 9-inch wind tunnel with solid sidewalls and flexible upper and lower rod walls capable of 3-D contouring was used to test an axisymmetric and a winged lifting model at $M=0.50$ to 0.95 . The simple, direct analytical method for wall contouring uses the model geometry for solid blockage and iterative model force data to adapt for lift and for wake blockage. Solid sidewall effects and the convergence of the adaptation scheme are evaluated. Linear and nonlinear theory for solid blockage is compared.

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Interesting comparisons are also made between 2-D and 3-D wall contouring.
Author (GRA)

N84-10103# Battelle Columbus Labs., Ohio.
IMPROVED ACRYLIC SYSTEMS FOR RAPID RUNWAY REPAIR
Final Report, Jun. - Sep. 1982
U. S. NANDI, R. G. SINCLAIR, P. C. BEHRER, J. P. BOYER, and M. J. SNYDER Tyndall AFB, Fla. Air Force Engineering and Services Center May 1983 38 p refs
(Contract F08635-82-C-0315)
(AD-A130389; AFESC/ESL-TR-82-46) Avail: NTIS HC A03/MF A01 CSCL 111

The objectives of this research were to achieve a basic improvement in the water compatibility of acrylic materials and to utilize lower cost acrylic materials, while maintaining the desirable characteristics of the DOMA system: rapid strength development over a full environmental range, high strength and toughness, low viscosity, minimum flammability and toxicity hazards, long shelf life, and ease of handling. The resultant HEMA resin yielded about 100-percent wet strength improvement with cost lowered to approximately \$1.13 per pound from \$2.17 per pound for DOMA. These improvements led to inclusion of HEMA in the Advanced Bomb Damage Repair Systems subtask of the Rapid Runway Repair Program.
Author (GRA)

N84-10104# Battelle Columbus Labs., Ohio.
ULTRAVIOLET CURABLE RESIN SYSTEM FOR RAPID RUNWAY REPAIR
Final Report, Mar. - Sep. 1982
J. P. PFAU, R. E. SHARPE, M. J. SNYDER, R. L. HUGGINS, and F. A. FORSTER Tyndall AFB, Fla. Air Force Engineering and Services Center Apr 1983 45 p refs
(Contract F08635-82-C-0214; AF PROJ. 2673)
(AD-A130364; AFESC/ESL-TR-82-51) Avail: NTIS HC A03/MF A01 CSCL 111

In this exploratory program, the UV-initiated cure of small test samples (2 inches by 2 inches by 3/4 inch) of a furan resin concrete was demonstrated. However, due to the high cost of the UV initiator (diphenyliodonium hexafluoroarsenate), the amount of initiator required to obtain complete cure results in a very high-cost polymer concrete. Three approaches -- reducing the amount of initiator, use of a catalyst, and use of alternate, more reactive initiators -- for reducing the cost of the UV-initiated furan concrete were investigated. None of these approaches, all of which would effectively reduce cost through reducing the amount of required initiator, yielded a completely cured furan concrete upon UV exposure.
Author (GRA)

N84-10105# BDM Corp., McLean, Va.
THE EFFECTS OF WEATHER ON RAPID RUNWAY REPAIR, VOLUME 2
Final Report, 30 Jun. - 5 Nov. 1982
J. M. WHITEHEAD, M. D. HOFFMAN, P. G. POTTER, C. P. NEUSWANGER, and M. M. WILDING Tyndall AFB, Fla. Air Force Engineering and Services Lab. May 1983 317 p
(Contract F08635-80-C-0206, AF PROJ. 2621)
(AD-A130350, BDM/W-82-592-TR-VOL-2; AFESC/ESL-TR-82-41-VOL-2) Avail: NTIS HC A14/MF A01 CSCL 01E

This technical report is divided into two volumes. Volume 1 contains the technical analysis and weather effects RRR process, while Appendix A, Weather Data, is published as Volume 2 because of its size. This report presents the results of a study to identify the effects of weather on Rapid Runway (RRR). There are two major components of the study. The first characterizes the aspects of weather affect RRR, by area for Korea, Europe, and England. Graphs present data on temperature, precipitation, visibility, wind, and humidity. The second component studies the effects of weather on the RRR process. The process is divided into activities, with associated efficiencies under various weather conditions. Values for efficiencies are developed from military and industrial data. The two components are combined with a critical path analysis of several RRR procedures. The report identifies potential solutions to some weather related problems, and makes recommendations for further study.
GRA

N84-10106# Air Force Human Resources Lab., Brooks AFB, Tex.

LOW ALTITUDE SIMULATOR TRAINING: A-10 AIRCRAFT **Technical Paper**

B. J. PIERCE Jun 1983 43 p refs
(Contract AF PROJ. 1123)
(AD-A130794; AFHRL-TP-82-43) Avail: NTIS HC A03/MF A01 CSCL 01B

Simulator scenarios were developed to train student pilots in A-10 aircraft low level navigation (LLN) and elementary basic attack maneuvers (BAMs). The primary objective of this effort was to evaluate the effectiveness of these scenarios using the A-10 configured Advanced Simulator for Pilot Training (ASPT) as the training medium. Training effectiveness was assessed using simulator automated performance measures and instructor pilot (IP) evaluations of student aircraft performances in a transfer paradigm. There were 42 subjects in the BAM phase of the experiment and 36 subjects in the LLN phase. Simulator measures showed enhanced performance as a function of training for three of the five BAM tasks trained, LLN simulator performance data were not analyzed due to difficulty with the automated scoring procedures. Power values determined for aircraft performance measures and inferences based on the results of similar efforts made questionable the validity of using IP performance evaluations for test purposes as was done in this experiment. Discussion is directed toward future test programs requiring assessment of pilot performances in tactical aircraft.
Author (GRA)

N84-10107# Colorado State Univ., Fort Collins.
ROTATING-BOOM FACILITY FOR EVALUATION OF WIND CHARACTERISTICS APPROACHING A WIND-TURBINE BLADE
V. A. SANDBORN Sep 1982 30 p
(Contract DE-AC06-76RL-01830)
(DE83-013117; PNL-3960) Avail: NTIS HC A03/MF A01

A rotating boom apparatus has been developed to test transient anemometer measurements on rotating systems. The apparatus consists of a counter balanced helicopter blade mounted vertically at the top of a walk up scaffold. The blade is rotated by a variable speed, one half horsepower electric motor. The system is designed to operate over a range of rotation speeds, from less than 10 to approximately 100 revolutions per minute. Either hot wire or hot film anemometers can be mounted at the tip of the blade. The anemometers will sense both the normal and vertical wind components approaching the blade. Two battery powered, constant temperature anemometers can be mounted to the counterbalance side of the boom. The output of the anemometers is taken off the rotating shaft by a series of slip rings. Techniques for measuring the normal and vertical time dependent wind velocities approaching a rotating wind turbine blade are also evaluating the two components of turbulence, it may be difficult to apply in the wind turbine case.
DOE

N84-11106*# Massachusetts Inst. of Tech., Cambridge. Lab. for Flight Transportation
DEVELOPMENT OF REAL-TIME ATC SIMULATION FACILITY
J. PARARAS In NASA Langley Research Center Joint Univ. Program for Air Transportation Res. p 89-98 Oct. 1983 refs
Avail: NTIS HC A07/MF A01 CSCL 01E

The Flight Transportation Laboratory has developed a real time interactive Air Traffic Control simulation facility designed to provide a versatile and easy to use tool for research and experimentation involving air traffic control. The facility uses a VAX-11/750 as the central computer. The SANDERS GRAPHICS-7 display system is used to simulate air traffic control displays. Pseudo-pilot displays are provided on Texas Instruments TI940 video terminals. Finally, a custom designed audio system driven by a Z-80 and interfaced with the VAX provides voice communication between the air traffic controllers and the pseudo-pilots. The audio system provides computer controlled voice disguising and thus allows each aircraft to have its own audio characteristics and provides an added realism to the experiment. The facility can accommodate multiple controller stations and pseudo-pilot stations. Each station is manned by a single operator who has a large repertoire of commands with

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which to control his/her display and the simulated aircraft under his/her jurisdiction. An additional console and a distinct set of commands allow full controllability of the simulation environment by the experimenter in real time.

N84-11181 Illinois Univ., Urbana.
OPTIMIZATION OF LONG RANGE MAJOR REHABILITATION OF AIRFIELD PAVEMENTS Ph.D. Thesis
D. H. ARTMAN, JR. 1983 170 p
Avail: Univ. Microfilms Order No. DA8309907

A methodology for managing pavement networks over prolonged analysis periods as developed. Separate independent methods were devised for project and network level analysis, and the project level procedures were designed to provide inputs into the network level procedures. The project level analysis procedures optimally select and schedule major rehabilitation activities (routine maintenance, reconstruction, and overlays) over an extended analysis period. A computer code was written to use dynamic programming methods to optimally select schedule the activities (routine maintenance, reconstruction, and overlays) over the analysis period (20 years), by maximizing the structural performance area under the utility weighted Pavement Condition Index (PCI) versus time curve. These results can be used by decision makers and pavement engineers to help decide which rehabilitation activities should be considered and when to schedule them.

Dissert. Abstr.

N84-11182# Federal Aviation Administration, Atlantic City, N.J.
EVALUATION OF RETROREFLECTIVE PAVEMENT MARKERS FOR PRECISION AND NONPRECISION RUNWAYS Final Report,
Mar. 1981 - Dec. 1982

G. S. BROWN Sep. 1983 38 p refs
(Contract FAA PROJ. 081-502-520)
(FAA-CT-82-164) Avail: NTIS HC A03/MF A01

Retroreflective pavement markers installed to duplicate the patterns of runway centerline and touchdown zone lighting systems used for Category II runways were evaluated. The purpose was to (1) determine whether the markers could enhance nighttime visual guidance and reduce minimums for Category I precision or nonprecision approaches and (2) determine if such guidance could provide increased safety of operations, particularly under wet runway conditions. Flight tests were conducted at two airports, one with a 150- by 6,144-foot runway and the other 100 by 2,950 feet. The shorter runway required a scaled down or abbreviated touchdown zone and color coded runway centerline. Visual contact height with the retroreflective pavement marker systems was not enhanced prior to reaching Minimum Descent Altitude (MDA) or Decision Height (DH) for nonprecision or Category I approaches, respectively; therefore, this system will not permit the reduction in approach minimums for Category I precision or nonprecision approaches. However, the test program demonstrated that, in the opinion of a widely diversified sample of user pilots, the system is effective in improving the safety of operation for final approach, flare, touchdown, landing, rollout, and for takeoffs. Author

N84-11183# Committee on Science and Technology (U. S. House).

TECHNOLOGY OF AIRPORT SAFETY

Washington GPO 1983 199 p Hearing before the Subcomm. on Transportation, Aviation and Mater. of the Comm. on Sci. and Technol., 98th Congr., 1st Sess., no. 24, 18 Jul. 1983
(GPO-24-762) Avail: Subcommittee on Transportation, Aviation and Materials

The problems of airport safety are discussed with an emphasis on the use of technology to enhance the safety of airport systems. Specific criticisms of specific airports are examined in order to determine the adequacy of Government policy and research efforts. Other important matters such as the approach and departure procedures, the impact of noise abatement procedures on safety, aviation weather programs, terminal area guidance, airport design criteria, and fire and rescue capabilities are addressed. The technological needs and opportunities presented by short takeoff

and landing aircraft and whether to use this technology to increase airport capacity are reviewed. S.L.

N84-11184# Illinois Univ., Urbana. Dept. of Civil Engineering.
RUBBER REMOVAL FROM POROUS FRICTION COURSE Final Report

S. H. CARPENTER and E. J. BARENBERG Washington FAA Sep 1983 51 p refs
(Contract DTFA01-81-C-10085)
(FAA-PM-83-31) Avail: NTIS HC A04/MF A01

Rubber buildup on runways is a serious problem because it reduces friction on the runway. Where a porous friction course has been placed to improve frictional and drainage characteristics the problem of rubber buildup becomes even more serious because friction and water drainage both are lost. The occurrence of rubber buildup on porous friction courses and the methods used to remove the buildup are examined. Some innovative techniques were used to remove rubber from a PFC, however, most could not be evaluated because the surfaces had been replaced or resurfaced. Of all techniques, high pressure water blasting was felt to present the most promise for efficient rubber removal. Discussions with contractors pointed out the difficulties in planning and controlling the high pressure removal technique. A simple analysis was conducted to illustrate the effect variations in the operating parameters had on the work being done by the water. Careful control of these parameters will be required for their use on PFC surfaces where the potential for damage is high. Author

N84-11185# Arbeitsgemeinschaft Deutscher Verkehrsflughafen, Stuttgart (West Germany).

DETERMINATION OF THE PAVEMENT CLASSIFICATION NUMBER (PCN) OF AIRFIELDS (ERMITTLUNG DER PAVEMENT CLASSIFICATION NUMBER (PCN) VON FLUGBETRIEBSFLAECHEN)

G. D. SCHMIDT Feb. 1983 84 p refs In GERMAN
(ISBN-3-87977-0530) Avail: NTIS HC A05/MF A01

Airfield PCN's were determined using the mathematical bearing strength model of the aircraft classification number PCN method. The equivalent limit load is calculated with simple mathematical and graphic methods. Flexible and rigid bearing systems (pavement structure, prepared subgrade, subgrade, California bearing ratio, modulus of soil reaction) are described. The lifetime of a bearing system depends on the static load cycle factor which is approximately calculated taking into account loading in the past and the future. The criteria to take dynamic additional loads into account are given. The PCN is determined for flexible and rigid coverings using a mathematical-analytical and a graphical method. Author (ESA)

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ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation, and spacecraft propulsion and power.

N84-10142*# Honeywell, Inc., Clearwater, Fla.
SPACE SHUTTLE DESCENT FLIGHT CONTROL DESIGN REQUIREMENTS AND EXPERIMENTS LEARNED, PT. 1 P 617-628

G. KAUFER and D. WILSON In NASA. Langley Research Center Shuttle Performance: Lessons Oct. 1983 refs
Avail: NTIS HC A99/MF A01 CSCL 22B

Some of the lessons learned during the development of the Space Shuttle descent flight control system (FCS) are reviewed. Examples confirm the importance for requirements definition, systems level analyses, and testing. In sounding these experiences

may have implication for future designs or suggest the discipline required in this engineering art. R.J.F.

N84-10144*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va

SHUTTLE PERFORMANCE: LESSONS LEARNED, PART 2

J. P. ARRINGTON, comp. and J. J. JONES, comp. Washington Oct. 1983 746 p refs Conf. held in Hampton, Va., 8-10 Mar. 1983 2 Vol

(NASA-CP-2283-PT-2; L-15673-PT-2; NAS 55:2283-PT-2) Avail: NTIS HC A99/MF A01 CSCL 22B

Several areas of Space Shuttle technology were addressed including aerothermal environment, thermal protection, measurement and analysis, Shuttle carrier aerodynamics, entry analysis of the STS-3, and an overview of each section.

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CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

A84-10453

BASIC FAILURE MECHANISMS OF LAMINATED COMPOSITES AND RELATED AIRCRAFT DESIGN IMPLICATIONS

R. C. SANDERS, E. C. EDGE, and P. GRANT (British Aerospace PLC, Aircraft Group, Preston, Lancs., England) IN: Composite structures 2; Proceedings of the Second International Conference, Paisley, Scotland, September 14-16, 1983. London, Applied Science Publishers, 1983, p. 467-485. Research supported by the Ministry of Defence. refs

A critical literature survey of the major failure criteria of laminated fiber reinforced composites is initially carried out. The failure modes of unidirectional material are then summarized, and related to layer failure modes in multidirectional laminates. A critical upper bound of matrix strain is identified as being a limiting factor in layer longitudinal tensile strength and interaction criteria are proposed for combined layer shear and longitudinal tension or compression. It is shown that reasonable knowledge of hydrothermal stresses can be important in predicting laminate failure, and that further work concerning the quantification of these is required. A strength envelope of the cross-ply laminate is produced showing the significance of the various failure modes. Author

N84-10188*# Lockheed Corp., Burbank, Calif.

FLIGHT SERVICE EVALUATION OF KEVLAR-49 EPOXY COMPOSITE PANELS IN WIDE-BODIES COMMERCIAL TRANSPORT AIRCRAFT Annual Flight Service Report, Jan. - Dec. 1982

R. H. STONE Feb. 1983 40 p refs

(Contract NAS1-11621)

(NASA-CR-166065, NAS 1 26.166065; AFSR-9) Avail: NTIS HC A03/MF A01 CSCL 11D

Kevlar-49 fairing panels, installed as flight service components on three L-1011s, were inspected after 9 years of service. There are six Kevlar-49 panels on each aircraft: a left hand and right hand set of a wing body sandwich fairing; a solid laminate under wing fillet panel, and a 422 K (300 F) service aft engine fairing. The fairings have accumulated a total of 70,000 hours, with one ship set having over 24,000 hours service. The Kevlar-49 components were found to be performing satisfactorily in service with no major problems, or any condition requiring corrective action. The only defects noted were minor impact damage, a few minor disbands and a minor degree of fastener hole fraying and elongation. These are for the most part comparable to damage noted on fiberglass fairings. The service history to date indicates that Kevlar-49 epoxy composite materials have satisfactory service characteristics for use in aircraft secondary structure. S.L.

N84-10216# Costruzioni Aeronautiche Giovanni Agusta S.p.A., Gallarate (Italy). Technological Development Dept.

ADVANCED ND TECHNIQUES FOR COMPOSITE PRIMARY STRUCTURES

M. FARIOLI, F. PORRO, G. SAMANNI, and V. WAGNER IN AGARD Characterization, Anal. and Significance of Defects in Composite Mater. 18 p Jul. 1983 refs

Avail: NTIS HC A14/MF A01

One of the weakest points in composites and adhesives technology is that there is no one N.D. method useful and valid for all kinds of defects. A variety of N.D. methods is needed in order to achieve good results in the inspectability of configurations. Some of the most popular techniques for maximum sensitivity determination of standard defects using proof specimen are reviewed. These include X-ray radiography and in-line radioscopy electronically supported; X-ray xeroradiography; neutron radiography; and U.S. investigation methods. The application of these techniques and results obtained on the main rotor spar and blade main rotor blade grip are discussed. A.R.H.

N84-10219# Royal Aircraft Establishment, Farnborough (England) Materials and Structures Dept.

THE SIGNIFICANCE OF DEFECTS AND DAMAGE IN COMPOSITE STRUCTURES

R. T. POTTER IN AGARD Characterization, Anal. and Significance of Defects in Composite Mater. 10 p Jul. 1983 refs

Avail: NTIS HC A14/MF A01

The significance of defects and damage in fiber composite structures depends upon a wide range of decisions taken at every stage of the life of each particular structure, from the initial design conception, through detailed design and manufacture, to inspection, maintenance and repair procedures. Since many of these decisions interact, there is a need for a coherent overall philosophy for the management of defects and damage in fiber composite structures are to be efficient and cost effective. The general requirements of such a philosophy are considered and it is seen that further research is required particularly on the interaction of defects and damage with structural features. Some initial results and observations from the RAE program devised to study such interactions are presented. Author

N84-10221# McDonnell Aircraft Co., St. Louis, Mo.

EFFECT OF DEFECTS ON AIRCRAFT COMPOSITE STRUCTURES

R. A. GARRETT IN AGARD Characterization, Anal. and Significance of Defects in Composite Mater. 34 p Jul. 1983 refs

Avail: NTIS HC A14/MF A01

Seven manufacturing defects associated with mechanical fasteners for aircraft composite structures were investigated; out-of-round holes; broken fibers on the exit side of drilled holes; porosity; improper fastener seating depth; tilted countersinks; interference fit; and multiple fastener installation and removal cycles. Both static and fatigue test results are described, along with correlation with analysis techniques. The interaction of the effects of these defects on hole wear, measured in fatigue tests of structural joints, is considered. The effects of two types of service-induced damage are also described; low energy impact damage and 23mm HEI ballistic damage. The relative sizes of visible and non-visible damage as determined by visual and non-destructive inspection techniques are compared. Stitching and the inclusion of glass or Kevlar fiber buffer strips to improve the damage tolerance of carbon/epoxy structures are evaluated. Results of tests of carbon/epoxy panel structures are discussed. Correlation of experimental results with predicted residual static strength is good. Author

11 CHEMISTRY AND MATERIALS

N84-10222# General Dynamics Corp., Fort Worth, Tex.
THE ENGINEERING SIGNIFICANCE OF DEFECTS IN COMPOSITE STRUCTURES

D. J. WILKINS *In* AGARD Characterization, Anal. and Significance of Defects in Composite Mater. 11 p Jul. 1983 refs
Avail: NTIS HC A14/MF A01

The significance of defects in composite aircraft structures is described from a broad, practical viewpoint. Three generic defect types (cut fibers, matrix cracks, and delaminations) and simple load components that can be generalized to the most complex loading cases are considered. Methods for evaluating manufacturing and in-service damage in terms of the resulting local damage are reviewed and the possible benefits of more damage tolerant forms of composite materials are explored.

Author

N84-10223# British Aerospace Public Ltd Co, Preston (England). Aircraft Group.

DEFECT OCCURRENCES IN THE MANUFACTURE OF LARGE CFC STRUCTURES AND WORK ASSOCIATED WITH DEFECTS, DAMAGE AND REPAIR OF CFC COMPONENTS

C. S. FRAME and G. JACKSON *In* AGARD Characterization, Anal. and Significance of Defects in Composite Mater. 17 p Jul. 1983

Avail: NTIS HC A14/MF A01

Current activities in a research investigation into the effects of defects and damage, and their repair, are reviewed. Future work in this field is also discussed. The occurrences of defects and damage in large CFC structures (eg. Tornado taileron, Jaguar wing etc) are presented and experience gained from flight and ground testing is reported. The NDT detection and characterization methods are given together with an outline of the work proposed to overcome existing problem areas and limitations

Author

N84-10267*# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Materials Engineering.

FATIGUE CRACK GROWTH AND LOW CYCLE FATIGUE OF TWO NICKEL BASE SUPERALLOYS Final Report

N. S. STOLOFF, D. J. DUQUETTE, S. J. CHOE, and S. GOLWALKAR 16 Sep. 1983 51 p refs
(Contract NAG3-22)

(NASA-CR-174534; NAS 1.26:174534) Avail: NTIS HC A04/MF A01 CSCL 11F

The fatigue crack growth and low cycle fatigue behavior of two P/M superalloys, Rene 95 and Astrology, in the hot isostatically pressed (HIP) condition, was determined. Test variables included frequency, temperature, environment, and hold times at peak tensile loads (or strains). Crack initiation sites were identified in both alloys. Crack growth rates were shown to increase in argon with decreasing frequency or with the imposition of hold times. This behavior was attributed to the effect of oxygen in the argon. Auger analyses were performed on oxide films formed in argon. Low cycle fatigue lives also were degraded by tensile hold, contrary to previous reports in the literature. The role of environment in low cycle fatigue behavior is discussed.

M.G.

N84-10268*# Pratt and Whitney Aircraft Group, West Palm Beach, Fla. Government Products Div.

LOW STRAIN, LONG LIFE CREEP FATIGUE OF AF2-1DA AND INCO 718

A. B. THAKKER and B. A. COWLES Apr. 1983 152 p refs
(Contract NAS3-22387)

(NASA-CR-167989; NAS 1.26:167989; FR-15652) Avail: NTIS HC A08/MF A01 CSCL 11F

Two aircraft turbine disk alloys, GATORIZED AF2-DA and INCO 718 were evaluated for their low strain long life creep-fatigue behavior. Static (tensile and creep rupture) and cyclic properties of both alloys were characterized. The controlled strain LCF tests were conducted at 760 C (1400 F) and 649 C (1200 F) for AF2-1DA and INCO 718, respectively. Hold times were varied for tensile, compressive and tensile/compressive strain dwell (relaxation) tests. Stress (creep) hold behavior of AF2-1DA was also evaluated. Generally, INCO 718 exhibited more pronounced reduction in cyclic

life due to hold than AF2-1DA. The percent reduction in life for both alloys for strain dwell tests was greater at low strain ranges (longer life regime). Changing hold time from 0 to 0.5, 2.0 and 15.0 min. resulted in corresponding reductions in life. The continuous cycle and cyclic/dwell initiation failure mechanism was predominantly transgranular for AF2-1DA and intergranular for INCO 718

Author

N84-10332*# United Technologies Corp., East Hartford, Conn.
AN ASSESSMENT OF THE USE OF ANTIMISTING FUEL IN TURBOFAN ENGINES Contractor Report, Sep. 1979 - Mar. 1982

A. J. FIORENTINO and J. R. PLANELL Oct. 1983 180 p refs
(Contract NAS3-22045)

(NASA-CR-168081; NAS 1.26:168081; PWA-5697-65) Avail: NTIS HC A09/MF A02 CSCL 21D

An evaluation was made on the effects of using antimisting kerosene (AMK) on the performance of the components from the fuel system and the combustor of current in service JT8D aircraft engines. The objectives were to identify if there were any problems associated with using antimisting kerosene and to determine the extent of shearing or degradation required to allow the engine components to achieve satisfactory operation. The program consisted of a literature survey and a test program which evaluated the antimisting kerosene fuel in laboratory and bench component testing, and assessed the performance of the combustor in a high pressure facility and in an altitude reflight/cold ignition facility.

Author

N84-10336# Coordinating Research Council, Inc., Atlanta, Ga.
LOW TEMPERATURE BEHAVIOR OF FUELS IN SIMULATED AIRCRAFT TANKS

May 1983 65 p refs

(AD-A130267, CRC-532) Avail: NTIS HC A04/MF A01 CSCL 13D

Lockheed and Boeing each made a series of tests in aircraft fuel tank simulators to provide an improved understanding of the flowability and pumpability of jet fuels at or below their freezing point where waxy components separate. Each simulator represented a section of an aircraft wing fuel tank. Tests simulated the low temperature cruise environment associated with long duration flights under extreme, high-altitude conditions. Holdup, the fraction of unavailable fuel remaining in the tank after attempted fuel withdrawal, was used to characterize pumpability after low temperature exposure. The test fuels were derived from widely differing crude sources and were selected to cover a range of freezing points. Two of the test fuels were common to the Boeing and Lockheed investigations in order to assess variability due to simulator construction. One fuel in the Lockheed program contained a flow improver additive. In the Boeing program, one fuel was a blend of JP-5 and 9% manne diesel fuel

Author (GRA)

N84-10339# Air Force Engineering and Services Center, Tyndall AFB, Fla. Engineering and Services Lab.

THE USE OF FUEL ADDITIVES TO CONTROL PLUME OPACITY OF TURBINE ENGINE TEST CELLS Final Report, Mar. 1978 - Oct. 1981

O. M. LOVELAND, A. F. KLARMAN, J. TARQUINIO, and T. L. STODDART Apr. 1983 42 p refs
(Contract AF PROJ. 2054)

(AD-A130777; AFESC/ESL-TR-83-08) Avail: NTIS HC A03/MF A01 CSCL 21B

This research, a joint Air Force/Navy study, evaluated the use of fuel additives to reduce the opacity of turbine engine test cell emissions. Automated smoke abatement system (ASAS) was used to inject ferrocene and XRG fuel additives into J57-43 turbine engines. Data obtained from this study indicate that ferrocene can be used to control test cell opacity without major impact on engine performance. The XRG fuel additive was not effective in reducing opacity. Major problems encountered with the ASAS were resolved during the project. Recommendations for further improvement of the ASAS were reported.

Author (GRA)

N84-11214* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METAL MATRIX COMPOSITE STRUCTURAL PANEL CONSTRUCTION Patent

R. R. MCWITHEY, D. M. ROYSTER, inventors (to NASA), and T. T. BALES 25 Oct. 1983 8 p Filed 30 Jun. 1981 (NASA-CASE-LAR-12807-1; US-PATENT-4,411,380; US-PATENT-APPL-SN-280155; US-PATENT-CLASS-228-181; US-PATENT-CLASS-52-806; US-PATENT-CLASS-52-808; US-PATENT-CLASS-228-157; US-PATENT-CLASS-228-212; US-PATENT-CLASS-244-119; US-PATENT-CLASS-244-123; US-PATENT-CLASS-428-593) Avail: US Patent and Trademark Office CSCL 11D

Lightweight capped honeycomb stiffeners for use in fabricating metal or metal/matrix exterior structural panels on aerospace type vehicles and the process for fabricating same are disclosed. The stiffener stringers are formed in sheets, cut to the desired width and length and brazed in spaced relationship to a skin with the honeycomb material serving directly as the required lightweight stiffeners and not requiring separate metal encasement for the exposed honeycomb cells.

Official Gazette of the U.S. Patent and Trademark Office

N84-11260# United Technologies Corp., East Hartford, Conn. **DEFORMATION STUDIES IN WORKABLE SUPERALLOYS Final Report, 1 Oct. 1979 - 31 May 1983**

A. F. GIAMEI 31 May 1983 118 p refs (Contract F49620-82-C-0028, AF PROJ. 2306) (AD-A131606, UTRC/R83-916100-1; AFOSR-83-0724TR) Avail: NTIS HC A06/MF A01 CSCL 11F

A three year workability study of nickel-base superalloys has been completed. The objective was to study the high strain plastic flow behavior of high strength superalloys in the form of single crystals, rapidly solidified ingots and consolidated powder particles. The single crystal alloy studied was PWA 1444 (similar to Mar-M200) which had previously been well characterized at low strains. The flow characteristics of this alloy have now been documented out to 20% strain as a function of crystal orientation. The low to intermediate temperature flow stress has been measured after forming. Remarkable strain hardening has been obtained at low strains for high modulus crystals worked below the solvus temperature. Rapidly solidified and cooled ingots were made by arc melting or electron beam skull melting or induction melting and then 'drip melting' into a cold copper mold. The compositions and heat treatment were tailored to promote workability. Some of these buttons were heavily deformed in uniaxial compression under isothermal conditions below the gamma prime solvus temperature, and several were deformed in the single phase gamma region. High strains were achieved under conditions of constant displacement rate, true strain rate or energy input rate. GRA

N84-11296*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

OVERVIEW OF LIQUID LUBRICANTS FOR ADVANCED AIRCRAFT

W. R. LOOMIS 1982 19 p refs Presented at the Symp. on Lubricants for Extreme Environ. at the Joint Lubrication Conf., Washington, D.C., 4-6 Oct. 1982; sponsored by ASME and the American Society of Lubrication Engineers (NASA-TM-83529; E-1740; NAS 1.15:83529) Avail: NTIS HC A02/MF A01 CSCL 11H

An overall status report on liquid lubricants for use in high-performance turbojet engines is presented. Emphasis is placed on the oxidation and thermal stability requirements imposed upon the lubrication system. A brief history is given of the development of turbine engine lubricants which led to synthetic oils with their inherent modification advantages. The status and state of development of some nine candidate classes of fluids for use in advanced turbine engines are discussed. Published examples of fundamental studies to obtain a better understanding of the chemistry involved in fluid degradation are reviewed. Also, alternatives to high temperature fluid development are described. The importance of continuing work on improving high

temperature lubricant candidates and encouraging development of fluid base stocks is discussed S.L.

N84-11321# Naval Research Lab., Washington, D. C. Combustion and Fuels Branch.

A STATISTICAL EXAMINATION OF THE EFFECT OF COMPOSITION ON THE FREEZING POINTS OF HYDRO-CARBON MIXTURES Interim Report

W. A. AFFENS, R. N. HAZLETT, and D. E. SMITH 21 Jul. 1983 16 p refs (AD-A131000; NRL-8692) Avail: NTIS HC A02/MF A01 CSCL 21D

A series of three statistically designed experiments was run to study the effect of composition on the freezing point of model hydrocarbon fuels. For each experiment, regression equations were derived to describe the effect of composition on freezing point for various mixtures of n-alkanes and other hydrocarbons. These experiments showed that the higher n-alkanes and the interactions among them play an important role in freezing point. The n-alkanes C-16, C-15, and C-14 (in that order) had a strong positive effect (raised the freezing point). The n-alkanes C-12 and C-13 also had strong effects, with C-12 and C-13 in combination showing strong negative effects. However, the magnitude and direction (positive or negative) of the C-12 and C-13 effects (individually and in combination) were greatly dependent on the concentration of C-16. In general C-12 and C-13 individually had a positive effect when the C-16 mole fraction as small (less than 1.67 mol-%) but a negative effect in the presence of higher C-16 concentrations. The n-alkanes C-10 and C-11 had negligible effects. These behaviors were consistent with the results of previous NRL studies GRA

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ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.

A84-10142#

UNIFIED AEROELASTIC FLUTTER THEORY FOR VERY LOW ASPECT RATIO PANELS

G. A. OYIBO (Fairchild Republic Co., Farmingdale, NY) AIAA Journal (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1581-1587. refs

A theory unifying the flutter analyses of orthotropic and isotropic panels having very low aspect ratios and exposed to an inviscid potential flow on the upper surfaces is developed. The analysis considers an infinitely long panel of finite width, simply supported on the side edges, and resting on a spring foundation. Three-dimensional linearized aerodynamic and classical plate theories are used. Traveling wave modes are utilized as solutions to the panel's aeroelastic equation of motion. The resulting aerodynamic integral is evaluated approximately using both numerical and analytical methods. The structural and aerodynamic generic variables, which are instrumental in establishing this unified theory, are derived using affine transformations. Subsonic as well as supersonic flutter and divergence boundaries are determined. The effects of air to panel mass ratios and midplane forces are examined. Viscous structural damping is found to be destabilizing. There is a general agreement between the results of this analysis and those obtained for isotropic panels by previous investigators. Author

A84-10466

PLASTIC FORMING OF THIN-WALLED AIRCRAFT PARTS (THEORY AND COMPUTATION) [PLASTICHESKOE FORMOBRAZOVANIE TONKOSTENNYKH DETALEI AVIATEKHNIKI /TEORIYA I RASCHET/]

M. I. LYSOV and I. M. ZAKIROV Moscow, Izdatel'stvo Mashinostroenie, 1983, 176 p. In Russian. refs

The theoretical principles underlying the fabrication of thin-walled aircraft parts through plastic forming processes are discussed together with engineering methods for calculating the process variables. The processes examined include die forging and stamping, combined bending and rolling, elastic-die molding, expansion and profiling of tubular parts, and processes involving simultaneous plastic bending and stretching. Consideration is given to the factors leading to errors during forming, such as springback and various physical and geometrical nonlinearities. Formulas for calculating the force parameters of a process, residual stresses of molded parts, and geometrical parameters of the tooling are presented. V.L.

A84-10499*# General Motors Corp., Indianapolis, Ind. COMBUSTOR DEVELOPMENT FOR AUTOMOTIVE GAS TURBINES

P. T. ROSS, J. R. WILLIAMS (General Motors Corp., Detroit Diesel Allison Div., Indianapolis, IN), and D. N. ANDERSON (NASA, Lewis Research Center, Cleveland, OH) Journal of Energy (ISSN 0146-0412), vol. 7, Sept.-Oct. 1983, p. 429-435. Research supported by the U.S. Department of Energy. refs (Contract DEN3-168)

Previously cited in issue 17, p. 2742, Accession no. A82-35062

A84-10751

RADAR-82; PROCEEDINGS OF THE INTERNATIONAL CONFERENCE, LONDON, ENGLAND, OCTOBER 18-20, 1982

Conference sponsored by IEE, Convention of National Societies of Electrical Engineers of Western Europe, Institute of Mathematics and its Applications, et al. London, Institution of Electrical Engineers (IEE Conference Publication, No. 216), 1982, 524 p.

Topics related to radar systems are considered, taking into account intrapulse polarization agile radar, search strategies of phased array radars, design and performance considerations in modern phased array radar, a new generation airborne synthetic aperture radar system, results from a new dual band radar for sea surface and aircraft search, modular survivable radar for battlefield surveillance applications, and the Dolphin naval surveillance radar. Other subjects explored are concerned with sequential detection and MTI, adaptive processing techniques, HF/VHF radar, coherent radar processing, multisite radar operation, radar sea clutter, air traffic control, simulation and data processing, aspects of target recognition, low probability of intercept radar and passive operation, signal processing, low sidelobe antennas, and radar returns from weather and land. Attention is also given to beam forming with phased array antennas, optical fiber networks for signal distribution and control in phased array radars, and radar tracking systems. G.R.

A84-11038*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

TIME-MARCHING TRANSONIC FLUTTER SOLUTIONS INCLUDING ANGLE-OF-ATTACK EFFECTS

J. W. EDWARDS, R. M. BENNETT, W. WHITLOW, JR., and D. A. SEIDEL (NASA, Langley Research Center, Unsteady Aerodynamics Branch, Hampton, VA) (Structures, Structural Dynamics and Materials Conference, 23rd, New Orleans, LA, May 10-12, 1982, Collection of Technical Papers. Part 2, p. 220-233) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 899-906 refs

Previously cited in issue 13, p. 2109, Accession no. A82-30152

A84-11273* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

FERROGRAPHIC AND SPECTROMETER OIL ANALYSIS FROM A FAILED GAS TURBINE ENGINE

W. R. JONES, JR. (NASA, Lewis Research Center, Cleveland, OH) (International Conference on Advances in Ferrography, 1st, University College of Swansea, Swansea, Wales, Sept. 22-24, 1982) Wear (ISSN 0043-1648), vol. 90, Oct. 1, 1983, p. 239-249. refs

An experimental gas turbine engine was destroyed as a result of the combustion of its titanium components. It was concluded that a severe surge may have caused interference between rotating and stationary compressor parts that either directly or indirectly ignited the titanium components. Several engine oil samples (before and after the failure) were analyzed with a Ferrograph, and with plasma, atomic absorption, and emission spectrometers to see if this information would aid in the engine failure diagnosis. The analyses indicated that a lubrication system failure was not a causative factor in the engine failure. Neither an abnormal wear mechanism nor a high level of wear debris was detected in the engine oil sample taken just prior to the test in which the failure occurred. However, low concentrations (0.2 to 0.5 ppm) of titanium were evident in this sample and samples taken earlier. After the failure, higher titanium concentrations (2 ppm) were detected in oil samples taken from different engine locations. Ferrographic analysis indicated that most of the titanium was contained in spherical metallic debris after the failure. The oil analyses eliminated a lubrication system bearing or shaft seal failure as the cause of the engine failure. Previously announced in STAR as N83-12433

Author

A84-12196

AUTOMATED MEASUREMENTS OF ATMOSPHERIC VISIBILITY

W. VIEZEE and W. E. EVANS (SRI International, Menlo Park, CA) Journal of Climate and Applied Meteorology (ISSN 0733-3021), vol. 22, Aug. 1983, p. 1455-1461. Research supported by the Electric Power Research Institute. refs

The concept of using a solid-state, linear-array imaging device coupled with computerized scene analysis and display to measure daytime atmospheric visibility is described. Computer software is implemented for routine conversion of observed target and sky radiances into measurements of horizon contrast, visual range, target color impairment, and target modulation depth, i.e., target texture and clarity. An assembled, working instrument has been applied to field measurements. Several examples of field measurements are presented. The instrument is fully automated, and is available for visibility research; its applicability to routine visibility monitoring and as an operational tool for aircraft operations is explored.

Author

A84-12276

PULTRUSION ADAPTATION FOR HELICOPTER COMPONENT MANUFACTURE

E. E. BLAKE (Bell Helicopter Textron, Inc., Fort Worth, TX) ManTech Journal, vol. 8, no. 3, 1983, p. 14-17. Army-supported research

The application of a pultrusion technique to the manufacture of a lower-aft-cargo-door track for the U.S. Army UH-1 helicopter is described. The problems encountered in choosing the matrix material and designing the pultrusion machine are characterized. The process developed uses an undersize primary die to form and debulk the 50-percent resin, 7781-weave-E-glass adhesive prepreg rovings before wrapping with two pieces of epoxy-wetted fiberglass fabric and final pultrusion in a net-size die. Process parameters include die temperature = 150 F, loading = 4000 pounds, and feed rate = 10 inches/min. The door tracks are then postformed, and tests show track failure at more than 2.5 times the design load and no wear after 200,000 cycles. The raw-material cost is estimated as \$1.42/foot, comparable to that of Al (\$1.49/foot), and the weight saving over Al is 0.7 pounds/track. The labor costs for the pultrusion process, however, are not competitive, at least for this relatively simple structure.

T.K.

**N84-10056*# Sundstrand Corp., Rockford, Ill.
THE 400-HZ AIRCRAFT POWER-GENERATION SYSTEMS:
ADVANCING THE BASELINE**

T. GLENNON /in NASA. Lewis Research Center Aircraft Elect. Secondary Power p 1-12 Jun. 1983
Avail: NTIS HC A09/MF A01 CSCL 09C

Today's benchmark system for the Boeing 757/767/A310 airplanes and future trends in hydromechanical aircraft power generating systems are discussed. The 757/767/A310 system represents the commercial state of the art and the direction in which Sundstrand Corp. is headed, particularly in regard to weight reduction. Sundstrand introduced microprocessor control in an in service system in the Boeing 767 and was the first to use databus communications between the controls. Plans to develop this technology are briefly discussed. Alternative ways to produce and use power in aircraft are discussed. The integrated starter drive is discussed. R.J.F.

**N84-10057*# Naval Air Development Center, Warminster, Pa.
HIGH-VOLTAGE (270 V) DC POWER-GENERATING SYSTEM
FOR FIGHTER AIRCRAFT**

K. M. MCGINLEY /in NASA. Lewis Research Center Aircraft Elect Secondary Power p 13-25 Jun. 1983
Avail: NTIS HC A09/MF A01 CSCL 09C

The advantages of using high voltage, direct current advanced power generating systems in fighter aircraft are discussed. Weight reduction is achieved. Efficiency is increased 85 to 90 percent by eliminating the constant speed drive. Power interruptions are eliminated. There are no speed restrictions and no powerline constraints. Personal safety is increased by eliminating the hold on frequency, present in ac systems, which causes muscle contractions. R.J.F.

**N84-10058*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.
THREE-PHASE, HIGH-VOLTAGE, HIGH-FREQUENCY
DISTRIBUTED BUS SYSTEM FOR ADVANCED AIRCRAFT**

R. C. FINKE /in its Aircraft Elect. Secondary Power p 27-35 Jun. 1983
Avail: NTIS HC A09/MF A01 CSCL 09C

A three phase, high voltage, high frequency distributed bus system for advanced aircraft is discussed. A system model is given. Available components are described. Recommendations are given. R.J.F.

**N84-10059*# Boeing Commercial Airplane Co., Seattle, Wash.
SECONDARY ELECTRIC POWER GENERATION WITH MINIMUM
ENGINE BLEED**

G. E. TAGGE /in NASA. Lewis Research Center Aircraft Elect. Secondary Power p 37-50 Jun 1983
Avail: NTIS HC A09/MF A01 CSCL 01C

Secondary electric power generation with minimum engine bleed is discussed. Present and future jet engine systems are compared. The role of auxiliary power units is evaluated. Details of secondary electric power generation systems with and without auxiliary power units are given. Advanced bleed systems are compared with minimum bleed systems. A cost model of ownership is given. The difference in the cost of ownership between a minimum bleed system and an advanced bleed system is given. R.J.F.

**N84-10069*# General Electric Co., Binghamton, N.Y.
CYCLOCONVERTER ON THE ALL-ELECTRIC AIRPLANE**

R. C. WEBB /in NASA. Lewis Research Center Aircraft Elect. Secondary Power p 173-188 Jun. 1983
Avail: NTIS HC A09/MF A01 CSCL 09C

This paper discusses the application of a cycloconverter to a permanent magnet generator. Recent developments, advanced concepts, and advanced technology systems will be covered. Recent developments include permanent magnets, permanent magnet motors and generators, and power semiconductors.

Author

**N84-10430# Army Communications-Electronics Engineering
Installation Agency, Fort Huachuca, Ariz.**

**STANDARD ENGINEERING INSTALLATION PACKAGE.
GROUND CONTROL APPROACH RADAR SYSTEMS AND
RADOME(S) Final Report**

17 Jan. 1983 160 p refs
(AD-A130726; USACEEIA-SEIP-011) Avail: NTIS HC A08/MF A01 CSCL 17I

This standard engineering installation package (SEIP) is one in a series for upgrading air traffic control and navigational and landing aids at Army airfields and heliports worldwide. It provides the guidance involved in selecting, acquiring, and installing ground control approach radar systems. It gives a system description along with the technical aspects of the equipment and installation areas. It contains a list of applicable documents, describes a comprehensive checklist for site surveys, tells how to install equipment, the manpower required to do it and gives a bill of materials to accomplish it all. The SEIP describes quality assurance inspections and gives sample forms to ascertain areas of responsibility, checklists, and certification. One section gives a detailed test plan and checkout procedure while the system is in operation and suggests the form for a technical acceptance certificate. The SEIP also contains sample coordination documents of all agencies involved in the upgrading process and a completion certification that the project was met all of the test criteria.

Author (GRA)

**N84-10498*# National Aeronautics and Space Administration.
Ames Research Center, Moffett Field, Calif.**

**AN EXPERIMENTAL DOCUMENTATION OF TRAILING-EDGE
FLOWS AT HIGH REYNOLDS NUMBER**

P. R. VISWANATH (Stanford Univ.), J. W. CLEARY, and H. L. SEEGMILLER Aug. 1983 48 p refs
(NASA-TM-84375; A-9376; NAS 1.15:84375) Avail: NTIS HC A03/MF A01 CSCL 20D

Experiments documenting attached trailing-edge and near-wake flows at high Reynolds numbers are described. A long, airfoil-like model was tested at subsonic and low transonic Mach numbers, and both symmetrical and asymmetrical flows with pressure gradients upstream of the trailing edge were investigated. Model surface pressures and detailed mean and turbulence flow qualities were measured in the vicinity of the trailing edge and in the near-wake. The data obtained are of sufficient quality and detail to be useful as test cases in assessing turbulence models and calculation methods. M.G.

**N84-10546# Air Force Wright Aeronautical Labs.,
Wright-Patterson AFB, Ohio.**

**EVALUATION OF THE VARIABLE RELUCTANCE
TRANSDUCER/CARRIER AMPLIFIER METHOD OF
MEASURING LOW PNEUMATIC PRESSURES IN
AERODYNAMIC AND PROPULSION TESTING Final Report, 1**

Jan. 1975 - 1 Jun. 1981
D. L. MCCORMICK Feb. 1983 219 p refs
(Contract AF PROJ. 3066)

(AD-A130695; AFWAL-TR-82-2100) Avail: NTIS HC A10/MF A01 CSCL 14B

A complete evaluation is presented of the Variable Reluctance Transducer/Carrier Amplifier combination as a possible solution to many low-pressure measurement problems in experimental aerodynamics and turbine engine testing. Characteristic steady-state precision and accuracy of the method are bracketed. The quantitative evaluation is based mainly on empirical data, and theory is only used to show the simplicity of the principles of transduction and analog signal processing involved. Effects of elective and sometimes arbitrary choices on the part of equipment designers upon system performance, reliability, and operational effectiveness are discussed. Author (GRA)

12 ENGINEERING

N84-10609*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PARAMETRIC TIP EFFECTS FOR CONFORMABLE ROTAR APPLICATIONS

W. R. MANTAY and W. T. YEAGER, JR. Aug. 1983 31 p refs

(Contract DA PROJ. 1L2-62209-AH-76)

(NASA-TM-85682; NAS 1.15:85682; AVRADCOM-TR-83-B-4)

Avail: NTIS HC A03/MF A01 CSCL 20K

A research study was initiated to systematically determine the impact of selected blade tip geometric parameters on aeroelasticity conformable rotor performance and loads characteristics. The model articulated rotors included baseline and torsionally soft blades with interchangeable tips. Seven blade tip designs were evaluated on the baseline rotor and three tip designs were tested on the torsionally soft blades. The designs incorporated a systematic variation in three geometric parameters: sweep, taper, and anhedral. The rotors were evaluated in the NASA Langley Transonic Dynamics Tunnel at several advance ratios, lift and propulsive force values, and tip Mach numbers. Based on the test results, tip parameter variations generated significant rotor performance and loads difference for both baseline and torsionally soft blades. Azimuthal variation of elastic twist generated by the tip parameters strongly correlated with rotor performance and loads, but the magnitude of advancing blade elastic twist did not correlate

Author

N84-10610*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AEROMECHANICAL STABILITY OF A HINGELESS ROTOR IN HOVER AND FORWARD FLIGHT: ANALYSIS AND WIND TUNNEL TESTS

W. T. YEAGER, JR., M. N. H. HAMOUDA (Vigyan Research Associates, Inc.), and W. R. MANTAY Aug. 1983 21 p refs Prepared in cooperation with Army Aviation Research and Development Command

(Contract DA PROJ. 1L2-62209-AH-76)

(NASA-TM-85683; NAS 1.15:85683; AVRADCOM-TR-83-B-5)

Avail: NTIS HC A02/MF A01 CSCL 20K

A research effort of analysis and testing was conducted to investigate the ground resonance phenomenon of a soft in-plane hingeless rotor. Experimental data were obtained using a 9 ft. (2.74 m) diameter model rotor in hover and forward flight. Eight model rotor configurations were investigated. Configuration parameters included pitch flap coupling, blade sweep and droop, and precone of the blade feathering axis. An analysis based on a comprehensive analytical model of rotorcraft aerodynamics and dynamics was used. The moving block was used to experimentally determine the regressing lead lag mode damping. Good agreement was obtained between the analysis and test. Both analysis and experiment indicated ground resonance instability in hover. An outline of the analysis, a description of the experimental model and procedures, and comparison of the analytical and experimental data are presented.

S. L.

N84-10611*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

VERTICAL DROP TEST OF A TRANSPORT FUSELAGE SECTION LOCATED FORWARD OF THE WING

M. S. WILLIAMS and R. J. HAYDUK Aug. 1983 57 p refs

(NASA-TM-85679; NAS 1.15:85679) Avail: NTIS HC A04/MF

A01 CSCL 20K

A Boeing 707 fuselage section was drop tested at the NASA Langley Research Center to measure structural, seat, and occupant response to vertical crack loads. Post-test inspection showed that the section bottom collapsed inward approximately 2 ft. Preliminary data traces indicated maximum normal accelerations of 20 g on the fuselage bottom, 10 to 12 g on the cabin floor, and 6.5 to 8 g in the pelvises of the anthropomorphic dummies.

Author

N84-10614*# United Technologies Research Center, East Hartford, Conn.

RESEARCH AND DEVELOPMENT PROGRAM FOR THE DEVELOPMENT OF ADVANCED TIME-TEMPERATURE DEPENDENT CONSTITUTIVE RELATIONSHIPS. VOLUME 2: PROGRAMMING MANUAL Final Report

B. N. CASSENTI Jul. 1983 58 p refs

(Contract NAS3-23273)

(NASA-CR-168191; NAS 1.26:168191; R83-956077-2-VOL-2)

Avail: NTIS HC A04/MF A01

The results of a 10-month research and development program for nonlinear structural modeling with advanced time-temperature constitutive relationships are presented. The implementation of the theory in the MARC nonlinear finite element code is discussed, and instructions for the computational application of the theory are provided.

Author

N84-10616# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio. Metals Behavior Branch.

STATISTICS OF CRACK GROWTH OF A SUPERALLOY UNDER SUSTAINED LOAD Final Report, Jan. - Jun. 1982

J. N. YANG (George Washington Univ.) and R. C. DONATH Dec 1982 55 p refs

(Contract AF PROJ. 2307)

(AD-A130395; AFWAL-TR-82-4102) Avail: NTIS HC A04/MF A01 CSCL 11F

A statistically-formulated fracture mechanics model for crack growth under sustained load is used to analyze crack growth data from 23 compact tension specimens of IN100, a turbojet engine disc material. The procedures characterize crack growth rates as a lognormal random variable. The mean and standard deviation of the growth rate are determined from test data using the method of maximum likelihood. The method estimates crack growth rate parameters for each test specimen result. From these estimates, a lognormal creep crack growth rate model is developed from which is derived a statistical distribution of the crack size at any time. The distribution of time to reach some critical crack size is also presented. These distributions allow for the determination of the effect of hold time in the loading cycle on the life prediction of gas turbine engine discs.

Author (GRA)

N84-10620# Defence Research Establishment Pacific, Victoria (British Columbia)

APPLICATION OF FRACTOMAT/KRAK GAGES TO CRACK GROWTH MEASUREMENTS IN STRUCTURAL COMPONENTS

K. I. MCRAE Jul. 1982 19 p refs

(AD-A130945; DREP-82-3) Avail: NTIS HC A02/MF A01

CSCL 20K

Accurate crack size measurements are required for fracture mechanics' solution to component life predictions. Usual methods have limitations and the development of a real-time crack measurement technique would be of great value. The operation and accuracy of the 'Fractomat' device for crack growth measurement is assessed during its normal application to standard fracture mechanics specimens. The technique is found to be at least as accurate as surface microscopic examination. The further application of this technique to crack measurement of in-service flaw location and orientation are known. The potential application is then demonstrated by examination of crack growth during the laboratory fatigue fracture of a typical aircraft structural component, the forward wing trunnion of the CF-100 aircraft.

Author (GRA)

N84-10622# Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.

SEMIELLIPTICAL CRACKS ALONG HOLES IN PLATES AND LUGS Final Report, 5 Jan. 1981 - 30 Nov. 1982

A. F. GRANDT, JR., J. A. HARTER, and D. E. TRITSCH Wright-Patterson AFB, Ohio AFWAL May 1983 136 p refs

(Contract F33615-81-K-3206; AF PROJ. 2307)

(AD-A130786; AFWAL-TR-83-3043) Avail: NTIS HC A07/MF

A01 CSCL 01C

This report summarizes a basic research effort directed at characterizing the growth of semielliptical surface cracks embedded

along the bore of a hole in a large plate or an attachment lug. Fatigue cracks are grown in transparent polymer test specimens which allow in situ observation of the crack plane. Crack growth was recorded by time lapse photography. Subsequent measurement of the crack photographs gave crack size and shape changes as a function of elapsed cycles. A multidegree of freedom fracture mechanics model was developed to predict the growth of embedded surface and corner cracks located at open holes in plates loaded in remote tension. Crack growth predictions gave excellent agreement for the embedded surface crack plate results obtained under the current effort and also gave good results for corner cracked hole tests conducted under an earlier program.

GRA

N84-11456*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

APPLICATION OF LASER ANEMOMETRY IN TURBINE ENGINE RESEARCH

R. G. SEASHOLTZ 1982 9 p refs Presented at the Electron. Conf., Cleveland, 4-6 Oct. 1983; sponsored by Inst. of Elec. and Electron. Engr., Inc. (NASA-TM-83513, E-1860; NAS 1.15:83513) Avail: NTIS HC A02/MF A01 CSCL 14B

The application of laser anemometry to the study of flow fields in turbine engine components is reviewed. Included are discussions of optical configurations, seeding requirements, electronic signal processing, and data processing. Some typical results are presented along with a discussion of ongoing work. Author

N84-11457*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

VIDEO MODEL DEFORMATION SYSTEM FOR THE NATIONAL TRANSONIC FACILITY

A. W. BURNER, W. L. SNOW, and W. K. GOAD Aug. 1983 24 p refs Presented at Ann. Meeting of the Virginia Acad. of Sci. Avail: NTIS HC A02/MF A01 CSCL 14B

A photogrammetric closed circuit television system to measure model deformation at the National Transonic Facility is described. The photogrammetric approach was chosen because of its inherent rapid data recording of the entire object field. Video cameras are used to acquire data instead of film cameras due to the inaccessibility of cameras which must be housed within the cryogenic, high pressure plenum of this facility. A rudimentary theory section is followed by a description of the video-based system and control measures required to protect cameras from the hostile environment. Preliminary results obtained with the same camera placement as planned for NTF are presented and plans for facility testing with a specially designed test wing are discussed. Author

N84-11516# Battelle Columbus Labs., Ohio
A CRITICAL REVIEW OF THE SHORT CRACK PROBLEM IN FATIGUE Interim Report, 1 Jul. 1981 - 30 Jun. 1982

B. N. LEIS, M. F. KANNINEN, A. T. HOPPER, J. AHMAD, and D. BROEK Wright-Patterson AFB, Ohio AFWAL Jan. 1983 143 p refs

(Contract F33615-81-C-5051; AF PROJ. 2420) (AD-A131349; AFWAL-TR-83-4019) Avail: NTIS HC A07/MF A01 CSCL 20K

Fatigue crack growth rate predictions based on linear elastic fracture mechanics can significantly underestimate the growth rates of smaller cracks. This study was undertaken to assess the significance of this short-crack phenomenon relative to a damage tolerance analysis of turbine engine components. An integrated program of experimentation and analysis was undertaken to identify the crack tip parameters that control fatigue crack growth rates for small cracks. The program began with a detailed critical review of the available literature. This report presents the results of the literature review. Author (GRA)

N84-11517# California Univ., Berkeley. Dept. of Materials Science and Mineral Engineering.

FATIGUE BEHAVIOR OF LONG AND SHORT CRACKS IN WROUGHT AND POWDER ALUMINUM ALLOYS Annual Report, 15 Apr. 1982 - 14 Apr. 1983

R. O. RITCHIE May 1983 97 p refs (Contract AF-AFOSR-0181-82; AF PROJ. 2306) (AD-A131324; AFOSR-83-0616TR; UCB/RP/IE/A1013; AR-1) Avail: NTIS HC A05/MF A01 CSCL 11F

The fatigue behavior of short cracks, which are small compared to the scale of the microstructure, small compared to the scale of local plasticity or simply physically small (i.e., approximately < 1 mm), must be considered as one of the major factors limiting the application of defect-tolerant fatigue design for airframe and engine components. Accordingly, this program is aimed at identifying factors which govern the growth of such short cracks in a series of commercial aluminum alloys, with specific reference to behavior at near-threshold levels. In this report, the fundamental basis for the study is described in terms of (1) a detailed review of the factors which lead to differences in long and short crack behavior, and (2) a theoretical analysis of the influence of crack deflection and closure mechanisms on long and short crack behavior. It is concluded that many anomalies in the behavior of short fatigue cracks can be traced primarily to closure and deflection mechanisms, and accordingly an experimental program is represented with the objective of isolating these effects.

Author (GRA)

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GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

A84-10818

THE FEDERAL AVIATION ADMINISTRATION WEATHER RADAR RESEARCH AND DEVELOPMENT PROGRAM

D. E. JOHNSON (FAA, Washington, DC) IN: Radar-82; Proceedings of the International Conference, London, England, October 18-20, 1982. London, Institution of Electrical Engineers, 1982, p. 375-379. refs

The limitations of the surveillance radars that at present provide weather information to the FAA are noted. To overcome these limitations, the FAA is conducting research on the use of Doppler radars for weather detection. This development work is summarized. Most of this work is in support of the Next Generation Weather Radar (Nexrad). Nexrad is a joint program of the FAA, the National Weather Service, and the U.S. Air Force Air Weather Service to develop a weather radar with the goal of satisfying the weather radar needs of all three participants. C.R.

A84-11619

SOLITARY WAVES - A LOW-LEVEL WIND SHEAR HAZARD TO AVIATION

D. R. CHRISTIE and K. J. MUIRHEAD (Australian National University, Canberra, Australia) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Sept. 1983, p. 169-190. refs (Contract AF-AFOSR-83-0045)

Analytical consideration is given to the characteristics and manifestations of solitary waves in the atmosphere which pose low-level wind shear hazards to aircraft. The atmospheric solitons are the stable component appearing in the disintegration of long wave disturbances in the planetary boundary layer (PBL). The solitons are characterized by strong vertical and horizontal shears with an up-draft along the trailing edge, along with a down draft at the trailing edge and rapidly varying horizontal winds with maximized intensity at the center of the wave near the surface. Aircraft encountering a soliton experience a short period of positive

15 MATHEMATICAL AND COMPUTER SCIENCES

lift followed by an abrupt loss of lift, a situation frequently associated with air accidents. Data from over 1000 soliton observations in northern Australia indicate that the solitons are precursors to clear-air turbulence. The waves are a few kilometers across. The antecedent conditions have not yet been modeled successfully, although origins may be excitation of stable elevated inversion layers over the well-mixed daytime boundary layer. M.S.K.

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MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems, cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

A84-12040#

OPTIMUM ESTIMATION FOR ACCURACY OF DISTANCE BETWEEN MOUNTING HOLES FOR AIRCRAFT EQUIPMENT BY KALMAN FILTERING THEORY

Z. WANG (Weijian Machine Factory, Weijian, People's Republic of China) and S. BAO (Harbin Spare-Time College for Workers, Harbin, People's Republic of China). *Acta Aeronautica et Astronautica Sinica*, vol. 4, June 1983, p. 46-60. In Chinese, with abstract in English. refs

Experimental results from an investigation of the dimensional tolerances of the diameters of mounting holes and the distances between them in aircraft structural materials are reported. The study was performed using Kalman filtering theory, and optimized accuracy for manufacturing techniques currently in use in China was defined. Finally, a theoretical basis for establishing acceptable error margins is presented. M.S.K.

N84-10782# Dayton Univ., Ohio. Analytical Mechanics Group. MAGNA (MATERIALLY AND GEOMETRICALLY NONLINEAR ANALYSIS). PART 2: PREPROCESSOR MANUAL Final Report, Mar. 1980 - Dec. 1982

T. S. BRUNER, R. A. BROCKMAN, and K. A. PRIMROSE. Wright-Patterson AFB, Ohio AFWAL Dec. 1982 232 p refs. Supersedes AFWAL-TR-81-3180 (Contract F33615-80-C-3403; F33615-76-C-3103; AF PROJ. 2402) (AD-A129025; AFWAL-TR-82-3098-PT-2; AFWAL-TR-81-3180; UDR-TR-82-112) Avail: NTIS HC A11/MF A01 CSCL 09B

A preprocessor system developed for use in connection with three dimensional finite element analysis is described. The system consists of several data entry modules, a central preprocessor and various data translation and conversion utilities. Data entry and generation functions include keyboard, digitizer, and file inputs, which are oriented toward the type of thick shell geometry currently encountered in aircraft transparency analysis. The main preprocessor operates on models in superelement form, permitting selective mesh refinement, numerous geometric transformations, and merging of separate models to form the final analysis mesh. Data reformatting modules permit the generation of a complete input file for finite element analysis, and/or the translation of finite element data into other forms for archiving or further processing external to the preprocessor itself. Author (GRA)

N84-10783# Dayton Univ., Ohio. Analytical Mechanics Group. MAGNA (MATERIALLY AND GEOMETRICALLY NONLINEAR ANALYSIS). PART 4. QUICK-REFERENCE MANUAL Final Report, Mar. 1980 - Dec. 1982

R. A. BROCKMAN. Wright-Patterson AFB, Ohio AFWAL Dec. 1982 37 p (Contract F33615-80-C-3403; F33615-76-C-3103; AF PROJ. 2402) (AD-A129026; AFWAL-TR-82-3098-PT-4; UDR-TR-82-114) Avail: NTIS HC A03/MF A01 CSCL 09B

This manual summarizes access and operating procedures for the MAGNA finite element analysis program and related pre- and

postprocessing programs. Parallel descriptions are given for CDC, VAX, and CRAY versions of the programs where applicable. The overall organization of the system is also described, including possible data paths and data file types. The manual is intended to provide a broad summary of the MAGNA system, as well as a concise summary of the operating procedures described in other volumes of the program documentation. Author (GRA)

N84-10784# Lockheed-Georgia Co., Marietta.

COMPUTER-AIDED DESIGN AND EVALUATION TECHNIQUES (CADET) Final Report, Oct. 1981 - Dec. 1982

J. M. RICHARDS and M. A. COMPANION. Wright-Patterson AFB, Ohio AFWAL Dec. 1982 52 p refs (Contract F33615-81-C-3612; AF PROJ. 2403) (AD-A130146; AFWAL-TR-82-3096) Avail: NTIS HC A04/MF A01 CSCL 09B

The Computer-Aided Design and Evaluation Techniques (CADET) program was initiated to identify and evaluate computer techniques that might be used in the design and evaluation of crew systems. Recommendations for future expansion and development of such techniques by the Flight Dynamics Laboratory (FDL) of the AF Wright Aeronautical Laboratories are included. The original intent was to select those techniques that were compatible to computer hardware currently available at Wright-Patterson Air Force Base. Subsequent information indicated that future computer capacity made this constraint unnecessary. Existing techniques identified as having potential to augment FDL's flight station design methodology include a cad system, COMBIMAN, HOS, PLAID, SAINT, and WAM. GRA

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PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics

A84-10136*# North Carolina State Univ., Raleigh.

SUPERSONIC JET SCREECH TONE CANCELLATION

R. T. NAGEL, J. W. DENHAM, and A. G. PAPATHANASIOU (North Carolina State University, Raleigh, NC) *AIAA Journal* (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1541-1545 refs (Contract NAG3-189)

A new method of supersonic jet screech tone reduction is presented. The method utilizes a sound reflecting surface positioned upstream of the nozzle exit a distance of one-quarter wavelength of the fundamental screech tone. The reflector establishes a standing wave pattern of acoustic waves with a node at the nozzle exit plane. The pressure minimum at the exit halts the screech tone feedback mechanism. Experimental results indicate that the method eliminates supersonic jet screech as effectively as the currently accepted technique using an intrusive tab, but without distortion of the jet flow. The change in shock cell spacing, which occurs with an intrusive tab, does not occur when screech is cancelled with the new technique. The broadband shock-associated noise is also influenced much less when the jet screech tones are eliminated by the new method. Author

A84-10145#

EFFECT OF EDGE-TONE NOISE ON SUPERCRITICAL AIRFOIL DATA

L. H. OHMAN (National Research Council, High Speed Aerodynamic Laboratory, Ottawa, Canada) *AIAA Journal* (ISSN 0001-1452), vol. 21, Nov. 1983, p. 1597, 1598. refs

The results of an experimental investigation of edge-tone suppression, wall interference due to its presence, and the effects of edge-tone suppression on two-dimension airfoil test data are reported. A fine mesh screen was attached to the floor and ceiling of a two-dimensional test section of a wind tunnel which featured

a section of the BGK No. 1 airfoil. Wind velocities of Mach 0.3-0.8 were used at a chord Re of $10 \cdot 21 \times 1,000,000$. Data were taken with a differential pressure transducer, and revealed that the noise level in the tunnel was significantly reduced. Wake pressure measurements demonstrated that edge tone suppression did not affect transition at the Re range studied. In fact, no measureable effects were observed in subcritical flow, while a consistent small downstream shift in the upper surface shock location was detected in supercritical flow. M.S.K.

A84-11044*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ACOUSTICS OF ROTORS UTILIZING CIRCULATION CONTROL

M. MOSHER (NASA, Ames Research Center, Moffett Field, CA) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 946-952. refs

Previously cited in issue 07, p. 1146, Accession no. A81-20596

A84-11045#
LATERAL ATTENUATION OF AIRCRAFT NOISE

G. J. J. RUIJGROK (Delft, Technische Hogeschool, Delft, Netherlands) Journal of Aircraft (ISSN 0021-8669), vol. 20, Nov. 1983, p. 953-956. refs

Lateral attenuation of aircraft noise comprises all of the losses in addition to spherical spreading and atmospheric absorption. The phenomenon is primarily due to ground interference effects and is often regarded as a function of source-receiver distance and elevation angle. In this paper, theoretical predictions are made in order to examine the consistency of existing empirical data on lateral noise attenuation. The results indicate that the effects of source spectrum shape and meteorological conditions must also be considered in any model for predicting lateral noise attenuation. Author

N84-10910*# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.

LIGHT AIRCRAFT SOUND TRANSMISSION STUDY

M. ATWAL, J. DAVID, K. HEITMAN, and M. J. CROCKER Aug. 1983 26 p refs

(Contract NAG1-58)

(NASA-CR-174540; NAS 1.26-174540) Avail: NTIS HC A03/MF A01 CSCL 20A

The revived interest in the design of propeller driven aircraft is based on increasing fuel prices as well as on the need for bigger short haul and commuter aircraft. A major problem encountered with propeller driven aircraft is propeller and exhaust noise that is transmitted through the fuselage sidewall structure. Part of the work which was conducted during the period April 1 to August 31, 1983, on the studies of sound transmission through light aircraft walls is presented. Author

N84-11884*# Modern Analysis, Inc., Ridgewood, N. J.
STUDY OF NOISE TRANSMISSION THROUGH DOUBLE WALL AIRCRAFT WINDOWS

R. VAICAITIS Jun. 1983 93 p refs

(Contract NAS1-16117)

(NASA-CR-172182; NAS 1.26 172182; REPT-3) Avail: NTIS HC A05/MF A01 CSCL 20A

Analytical and experimental procedures were used to predict the noise transmitted through double wall windows into the cabin of a twin-engine G/A aircraft. The analytical model was applied to optimize cabin noise through parametric variation of the structural and acoustic parameters. The parametric study includes mass addition, increase in plexiglass thickness, decrease in window size, increase in window cavity depth, depressurization of the space between the two window plates, replacement of the air cavity with a transparent viscoelastic material, change in stiffness of the plexiglass material, and different absorptive materials for the interior walls of the cabin. It was found that increasing the exterior plexiglass thickness and/or decreasing the total window size could achieve the proper amount of noise reduction for this aircraft.

The total added weight to the aircraft is then about 25 lbs.

Author

N84-11887# Federal Aviation Administration, Washington, D.C. Office of Environment and Energy.

HELICOPTER NOISE SURVEY PERFORMED AT PARKER CENTER, PASADENA, AND ANAHEIM, CALIFORNIA, ON FEBRUARY 10-14, 1983

S. R. ALBERSHEIM Jun. 1983 34 p

(AD-A130962; FAA-EE-83-5) Avail: NTIS HC A03/MF A01

CSCL 20A

The FAA conducted a noise measurement survey of helicopter operations at three different helipads in the Los Angeles metropolitan area during the period of February 10-14, 1983. The purpose was to gather needed information for defining noise problems with in-service helicopter operations in a suburban and urban area. Noise level data were sampled for a variety of helicopters for different operating conditions and land use characteristics. The data collected reflect noise levels at these sites from all local sources of noise during that particular sampling period. These data from helicopter targets of opportunity are termed survey data as opposed to controlled test data in order to reflect the limited control over factors which contribute to the variability of the measured noise level. Author (GRA)

N84-11890 George Washington Univ., Washington, D.C.

AN ANALYSIS OF SHOCK COALESCENCE INCLUDING THREE-DIMENSIONAL EFFECTS WITH APPLICATION TO SONIC BOOM PREDICTION Ph.D. Thesis

C. M. DARDEN 1983 169 p

Avail: Univ. Microfilms Order No. DA8310879

A method for analyzing shock coalescence which includes three dimensional effects is developed. Based on an extension of the axisymmetric solution, the asymmetric effects are introduced through an additional set of governing equations which are derived by taking the second circumferential derivative of the standard shock equations in the plane of symmetry. The coalescence method is consistent with and was combined with a nonlinear sonic boom extrapolation program which is based on a modified method of characteristics. Though the two sets of governing shock equations are uncoupled, the flow equations, developed in the same manner, are weakly coupled through the first derivative of the cross flow term w , and since the characteristic behind the shock is necessary to fix shock location, an interactive procedure between the axisymmetric and asymmetric equations is used. The extrapolation program, originally unable to handle shock coalescence, is now able to extrapolate pressure signatures. Dissert. Abstr.

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SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

A84-10711

THE NEW PROCUREMENT CONCEPT AT THE USAF AERONAUTICAL SYSTEMS DIVISION ON AIRCRAFT OXYGEN SYSTEMS

D. W. SCHROLL (USAF, Aeronautical Systems Div., Wright-Patterson AFB, OH) IN: SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings. Van Nuys, CA, SAFE Association, 1983, p. 35-38.

17 SOCIAL SCIENCES

A84-11310

**LEGAL PROTECTION IN THE PLANNING OF AIRPORTS - THE
CONTESTABILITY OF THE AIRPORT CONSTRUCTION PERMIT
[RECHTSSCHUTZ BEI DER PLANUNG VON FLUGHAEFEN -
ZUR ANFECHTBARKEIT DER FLUGHAFENGENEHMIGUNG]**

H. O. HARBECK Zeitschrift fuer Luft- und Weltraumrecht (ISSN 0340-8329), vol. 32, Sept. 1983, p. 209-224. In German. refs

The provisions of FRG law governing the two-step approval process for new airport construction and the legal measures which may be taken to oppose or modify the approved plans are reviewed in the light of recent court decisions. Criticism of these decisions in the legal literature has claimed that insufficient legal protection is given to individuals or communities contesting airport approval, in part because the legal process allows construction or capital investment to begin, finally presenting the court with a fait accompli. It is shown that, while these criticisms are technically unfounded (since the present law and jurisdiction can provide adequate protection), air-law reforms could be helpful - but only if theory can find workable solutions to the fundamental conflicts between individual and community rights and the need for intelligent planning. The difficulties encountered in the application of the reformed nuclear-power-plant approval laws are cited as an example. T.K.

A84-11311

**PRODUCT LIABILITY IN AVIATION AND ITS INSURABILITY
[PRODUKTHAFTPFLICHT IM LUFTVERKEHR UND IHRE
VERSICHERBARKEIT]**

W. D. MUELLER-ROSTIN Zeitschrift fuer Luft- und Weltraumrecht (ISSN 0340-8329), vol. 32, Sept. 1983, p. 225-241. In German. refs

The provisions of FRG, European Parliament, Common Market, and U.S. law and jurisdiction regarding the liability of the manufacturers and sellers of aviation equipment are reviewed, with an emphasis on the recent increase in the amount of liability litigation. Consideration is given to such topics as contractually fixed warranties, negligence, strict liability in tort, the definition of 'manufacturer', and the different classifications of defects (fabrication defects, series defects, instruction defects, and quality-control outliers). It is shown that manufacturers, both of the finished aircraft and of its components, can be held liable for damages in many cases under all three legal systems, hence an umbrella insurance plan covering all participants in the construction of the aircraft is recommended. Policy provisions defining the insured parties, the losses insured, the contract duration, and the basis for calculating premiums are proposed. T.K.

national space policy and the aeronautical research and technology policy statements are included. J.M.S.

N84-12026*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

RESEARCH AND TECHNOLOGY, 1983 Annual Report

Nov. 1983 96 p

(NASA-TM-85702; NAS 1.15:85702) Avail: NTIS HC A05/MF A01 CSCL 05B

Highlights of major accomplishments and applications made during the past year illustrate the broad range of research and technology activities at the Langley Research Center. Advances are reported in the following areas: systems engineering and operation; aeronautics; electronics; space applications; aircraft and spacecraft structures; composite structures; laminar flow control; subsonic transport aircraft, and supersonic fighter concepts. Technology utilization efforts described cover a hyperthermia monitor, a lightweight composite wheelchair, and a vehicle ride quality meter. A.R.H.

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GENERAL

N84-11093*# National Aeronautics and Space Administration, Washington, D. C.

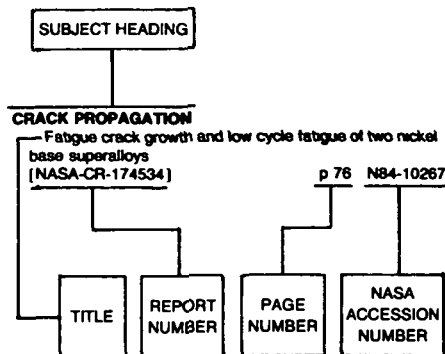
**AERONAUTICS AND SPACE REPORT OF THE PRESIDENT,
1982 ACTIVITIES Final Report**

1983 100 p refs

(NASA-TM-85454; NAS 1.15:85454) Avail: NTIS HC A05/MF A01

Achievements of the space program are summarized in the area of communication, Earth resources, environment, space sciences, transportation, aeronautics, and space energy. Space program activities of the various departments and agencies of the Federal Government are discussed in relation to the agencies' goals and policies. Records of U.S. and world spacecraft launchings, successful U.S. launches for 1982, U.S. launched applications and scientific satellites and space probes since 1975, U.S. and Soviet manned spaceflights since 1961, data on U.S. space launch vehicles, and budget summaries are provided. The

Typical Subject Index Listing



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- Symposium on Numerical and Physical Aspects of Aerodynamic Flows, 2nd, California State University, Long Beach, CA, January 17-20, 1983, Proceedings p 4 N84-10076
Flow quality in wind tunnels, Meeting, Bremen, West Germany, September 9, 10, 1982, Reports p 69 N84-10551
SAFE Association, Annual Symposium, 20th, Las Vegas, NV, December 6-10, 1982, Proceedings p 1 N84-10706
Radar-82, Proceedings of the International Conference, London, England, October 18-20, 1982 p 78 N84-10751
International Helicopter Forum, 14th, Bueckeburg and Hanover, West Germany, May 20, 21, 1982, Proceedings Part 1 - Military part Part 2 - Civil part p 1 N84-11051
PLANS '82 - Position Location and Navigation Symposium, Atlantic City, NJ, December 6-9, 1982, Record p 38 N84-12426
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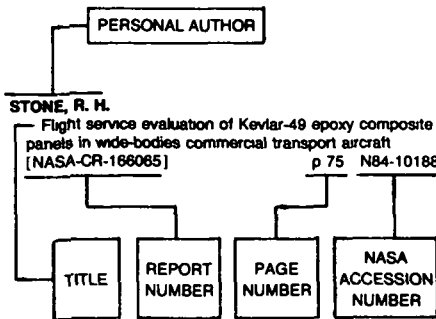
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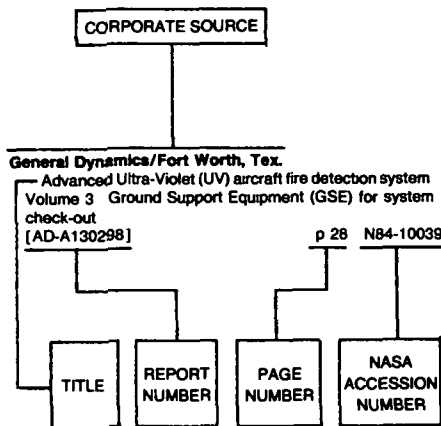
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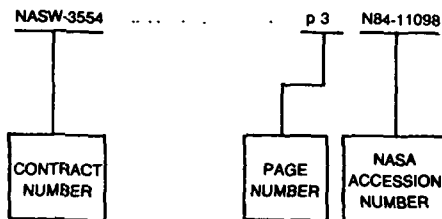
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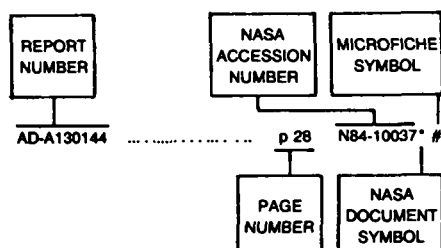
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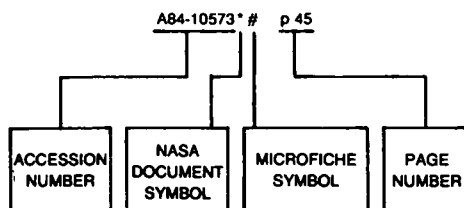
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